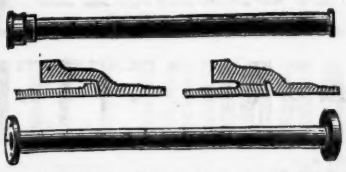
THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXVIII. No. 1742.] LONDON, SEPTEMBER 29, 1896. [48TH YEAR. PRICE 6d.

GAS AND WATER PIPES

1½ to 12 IN. BORE.



THOMAS ALLAN & SONS,

Bonlea Foundry,

SOUTH STOCKTON-ON-TEES.

Formerly Springbank Iron-Works, Glasgow.

ESTABLISHED 1848.

ALSO MANUFACTURERS OF

SANITARY & RAIN-WATER PIPES, HOT WATER PIPES, STABLE FITTINGS, RANGES, STOVES, And GENERAL CASTINGS.

Telegrams: "BONLEA, STOCKTON-ON-TEES."

Lanemark Coal Co.,

LIMITED.

LANEMARK CANNEL

AND GAS COALS.

Quotations and Analysis on Application to

LANEMARK COLLIERY,

NEW CUMNOCK, N.B.

Shipping Ports: All the principal Scotch Ports.

— ESTABLISHED 1830. —

PARKER & LESTER,

Manufacturers & Contractors.

THE ONLY MAKERS OF

PATENT ANTIMONY PAINT,

Parker's Imperial Black Varnish,

Oxide Paints, Oils, and General Stores for Gas and Water Works.

WORKS:

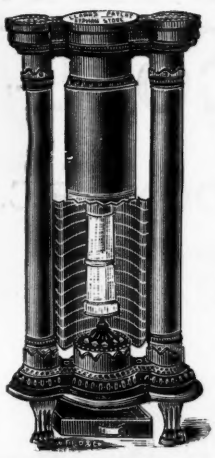
ORMSIDE STREET, OLD KENT ROAD, LONDON.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

97, WELLINGTON STREET, GLASGOW.

Prices and Analysis of all the Scotch Cannels on Application.



CLARK'S PATENT

"SYPHON" STOVES

FOR USE WITHOUT A FLUE.

NO FLUE REQUIRED. NO SMOKE. NO SMELL.
NO DIRT OR TROUBLE. NO DANGER.

The "SYPHON" Stove produces A PURE, EQUABLE, AND AGREEABLE HEAT, which can be graduated or sustained at the will of the user.

The most economical and convenient Heating Apparatus for all classes of Dwellings, and eminently suited for ENTRANCE HALLS, BEDROOMS, CONSERVATORIES, SHOPS, OFFICES, GALLERIES, CONCERT ROOMS, VESTRIES, &c., &c.

S. CLARK & CO.,

Patentees and Sole Makers,

SYPHON WORKS, PARK ST., ISLINGTON, LONDON, N.

Telegraphic Address: "SYPHON STOVES, LONDON."

SERVICE CLEANER.

HUTCHINSON BROTHERS,

GAS ENGINEERS, &c.,

MANUFACTURERS OF IMPROVED

WET AND DRY GAS-METERS.

STATION-METERS. LAMP-METERS.

TEST GASHOLDERS & GENERAL GAS APPARATUS.

BRASS MAIN AND LAMP TAPS.

UNIONS, FERRULES, ETC.

The "Falcon" Lamplighter's Torch. Service Cleaners.

SYPHON AND OTHER PUMPS.

Wood and Wrought-Iron Purifier-Grids. Scrubber Boards.

WET AND DRY METERS REPAIRED.

FALCON WORKS, BARNSLEY.

Telegrams: "HUTCHINSON BROS., BARNSLEY."

LAMP SERVICE CLEANER.

CASH PREPAYMENT METERS.

THE "POSITIVE" PREPAYMENT SLOT METER.

Noted for Strength and Simplicity of Construction.

Used by many Corporations and Gas Companies.

Material and Workmanship of the best.

Prices and full Particulars on application.

SAWER & PURVES, MANCHESTER.

THE "SIMPLEX" CARBURETTER

W. E. PRICE'S PATENT.

A NEW AND PERFECT METHOD OF ENRICHING GAS IN LARGE OR SMALL QUANTITIES AT A MOMENT'S NOTICE.

Special Features of the "SIMPLEX"—

SIMPLICITY, PERMANENCE OF RESULTS, CHEAPNESS, AND ENTIRE ABSENCE OF CONDENSATION.

For Prices and further Particulars, apply to the Manufacturers,

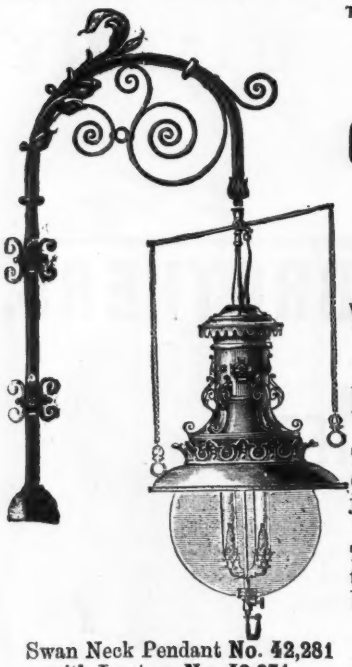
GIBBONS Bros., Ltd., DUDLEY.

FALK, STADELMANN, & CO., LD.,

VERITAS LAMP WORKS,

83, 85, & 87, FARRINGDON ROAD, LONDON, E.C.

Telegraphic Address: "Lamps, London." Telephone No. 6707



Swan Neck Pendant **No. 42,281** with Lantern **No. 42,271.**

THE "VERITAS" GAS ARC LANTERNS

(PROTECTED BY ROYAL LETTERS PATENT)

SPECIALLY CONSTRUCTED FOR THE

Incandescent System of Gas Lighting.

Wind, Rain, and Dust Proof.

Enamelled Steel throughout.

Made for One, Two, Three, and Five Lights.

The undisputed great advantages of the **Incandescent System of Gas Lighting** are frequently prejudiced by atmospheric influences upon the Mantles or by sudden gusts of wind.

These deficiencies have been entirely overcome by the construction of our "VERITAS" GAS ARC LANTERN, which differs from others, and which we are confident is the best yet offered.

Each Lantern complete; nothing to get out of order; and no skill is required in fixing.

No. 42,265.

Managers of Gas Companies will do well to apply for Descriptive Catalogue GRATIS.

(Wholesale only.)

THE BARROWFIELD IRON-WORKS, LIMITED,

Late LAIDLAW, SONS, & CAINE, Limited,

GAS ENGINEERS AND CONTRACTORS,

Telegrams: "GASOMETER GLASGOW."

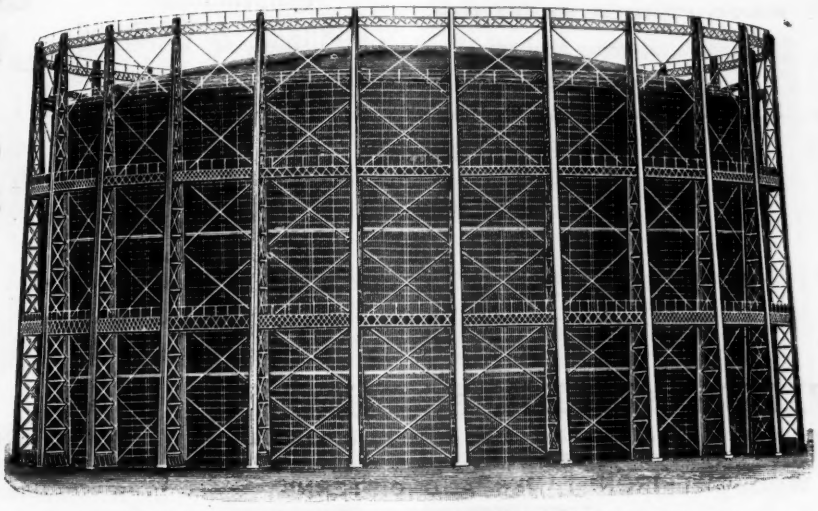
GLASGOW.

GAS APPARATUS OF EVERY DESCRIPTION.

RETORTS, CONDENSERS, SCRUBBERS, PURIFIERS.

GASHOLDERS AND TANKS.

ENGINES, EXHAUSTERS, STEAM BOILERS AND FITTINGS.



OIL PLANT AND CHEMICAL APPARATUS.

BRIDGES, GIRDERS, WHARVES, PIERS.

ROOFING OF EVERY STYLE.

PIPES, VALVES, AND CONNECTIONS.

THREE-LIFT GASHOLDER. Capacity, SIX MILLION cubic feet.
240 feet Diameter by 45 feet Deep each Lift. Erected at Glasgow, 1893.

London Office: 6, LITTLE BUSH LANE, CANNON STREET.

W. H. ALLEN & CO.,

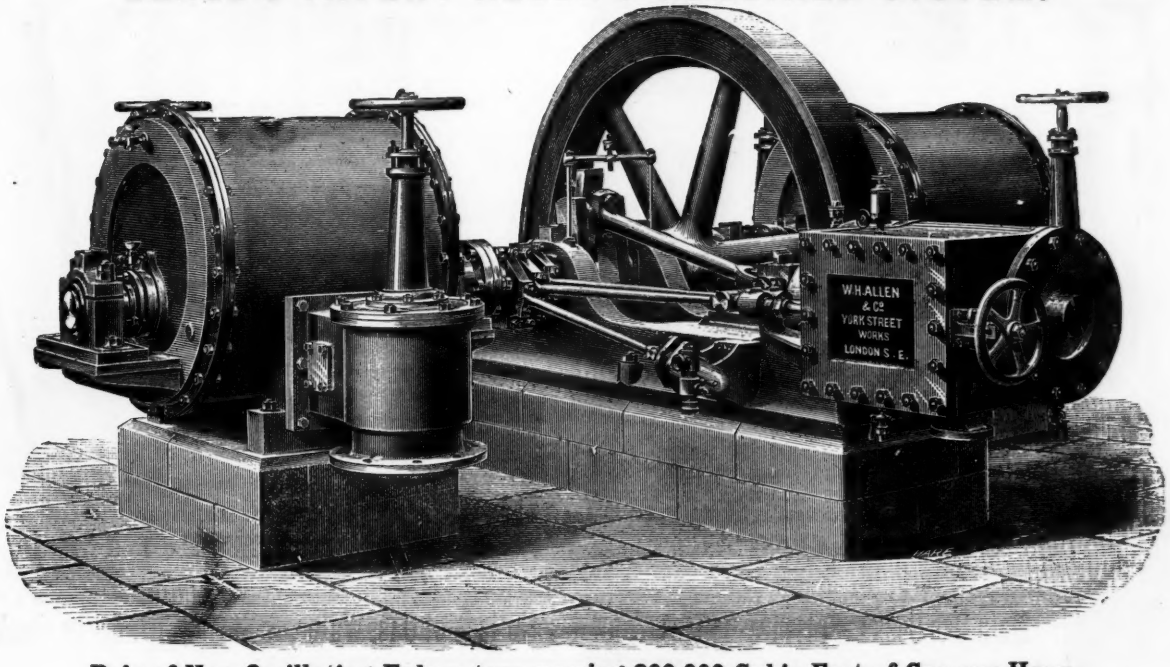
YORK STREET WORKS, LAMBETH, LONDON, S.E.,

And of QUEEN'S ENGINEERING WORKS, BEDFORD,

MAKERS OF THE MOST IMPROVED FORM OF

GAS EXHAUSTING MACHINERY

BEALE'S PATENT—ALLEN'S COMBINED SYSTEM.



Pair of Non-Oscillating Exhausters, passing 200,000 Cubic Feet of Gas per Hour.

GAS COAL.

BEST
REAL OLD SILKSTONE GAS COAL,
Address THE STRAFFORD COLLIERIES COMPANY,
Near BARNSLEY, SOUTH YORKSHIRE.

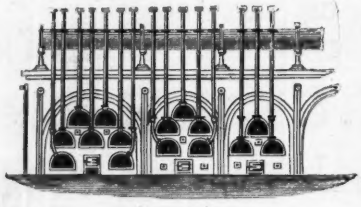
NEWTON, CHAMBERS, & CO., LIMITED,

THORNCLIFFE IRON-WORKS, near SHEFFIELD,

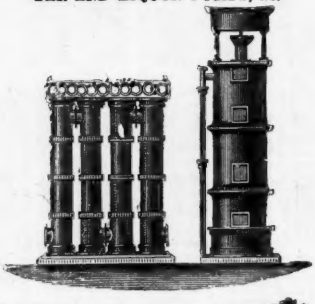
MANUFACTURERS OF

SLIDE VALVES,
WITH RACK & PINION
OR
Internal or External
SCREWS of all sizes.
GASHOLDERS,
AND
Gasholder Tanks.

CAST-IRON RETORTS,
RETORT-BED FITTINGS,
And Retort-House Appliances
of every description,
Iron Roofs, Columns, Girders, Floor Plates,
Tools, &c.

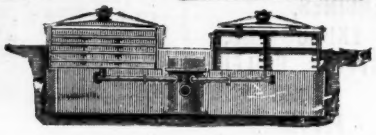


WROUGHT AND CAST IRON
CONDENSERS,
SCRUBBERS, & WASHERS,
TAR AND LIQUOR PUMPS, &c.



PATENT
CENTRE-VALVES
for working Purifiers,
Also Bye-Pass & Stop Valves.

PURIFIERS with Planed Joints,
HAND and HYDRAULIC LIFTING GEAR, CAST-IRON MAINS, and SPECIALS.
WOOD GRIDS.
CAST AND WROUGHT IRON TANKS AND CISTERNS.



DESIGNS, SPECIFICATIONS, AND ESTIMATES FREE.

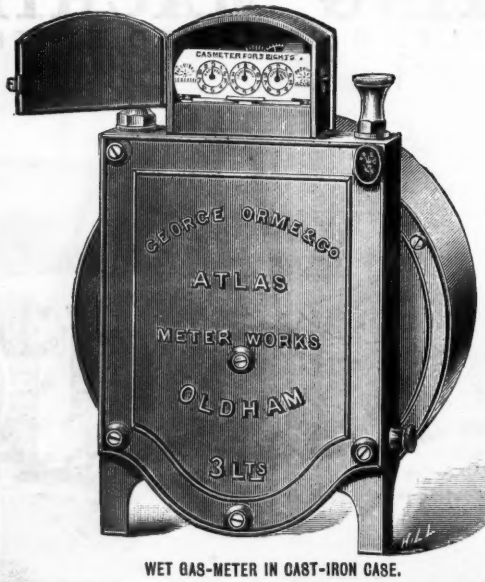
Pig Iron (*Special Quality*) for ENGINE CYLINDERS, &c.

GAS COAL FAMOUS FOR ITS UNRIVALLED EXCELLENCE.

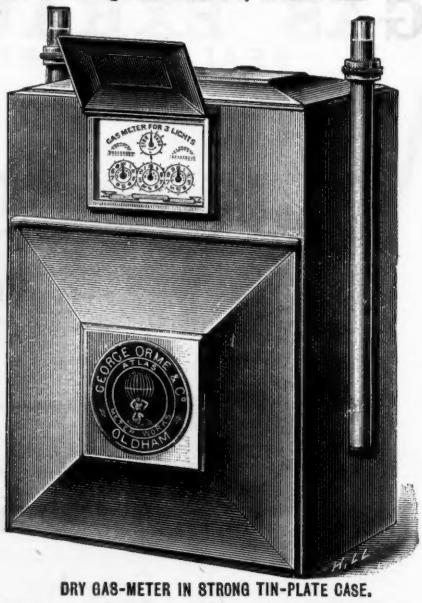
GEORGE ORME & CO.,

MANUFACTURERS OF IMPROVED WET AND DRY GAS-METERS,
ATLAS METER WORKS, OLDHAM.
Telegraphic Address: "ORME OLDHAM." National Telephone No. 93, OLDHAM.

No. 200.



WET GAS-METER IN CAST-IRON CASE.



DRY GAS-METER IN STRONG TIN-PLATE CASE.

ORME'S GAS REGULATOR FOR STREET LAMPS.
AS ILLUSTRATION NO. 200.
Adopted by the leading London and Provincial Gas Companies. More than 150,000 now in use.

Main Gas Cocks, Pressure-Gauges, & all descriptions of Gas, Water, & Steam Fittings in stock.

Illustrated Price Lists and full Particulars on application.

THE

Incandescent Gas-Light Co., LIMITED.

(WELSBACH Patents.)

Pronounced by Mr. Justice Wills, and confirmed by the Court of Appeal, to be

"A PIONEER INVENTION."

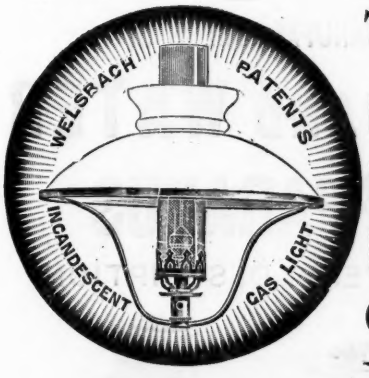
FURTHER DEVELOPMENTS; ENORMOUS ECONOMY;
IMMENSE SUPERIORITY; IMPORTANT IMPROVEMENTS.

THE NEW "GEM" BURNER, 5s. 6d.
THE NEW "GEM," 5s. 6d.
THE NEW "GEM," 5s. 6d.

35-Candle Power from $1\frac{3}{4}$ Cubic Feet of Gas!!!

THE "GEM" BURNER IS SPECIALLY SUITABLE FOR DOMESTIC LIGHTING.
GREATLY IMPROVED DISTRIBUTION OF LIGHT.

It is the Brightest "Gem."
20 Candles per Cubic Foot of Gas!!!



The WELSBACH INCANDESCENT GAS-LIGHT is the

MOST ECONOMICAL
MOST BRILLIANT
MOST HEALTHY
CLEANEST GAS

} LIGHT

THE "GEM" BURNER, 5s. 6d.
THE "C" BURNER, 6s. 6d.
THE "C" BYE-PASS BURNER, 7s. 6d.

Further Particulars and Price List can be had on application to the Company's Agents or leading WHOLESALE HOUSES, or to the

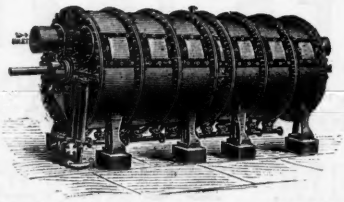
INCANDESCENT GAS LIGHT CO., Ltd.,

14, Palmer Street, Westminster.

W. C. HOLMES & CO.,

Contracting Engineers, AND MANUFACTURERS OF Gas & Chemical Plant.

Registered Telegraphic Address: "Holmes, Huddersfield."



London Office: 80, CANNON ST. Cablegrams: "Ignitor, London."

HOLMES' PATENT ROTARY SCRUBBER-WASHER.

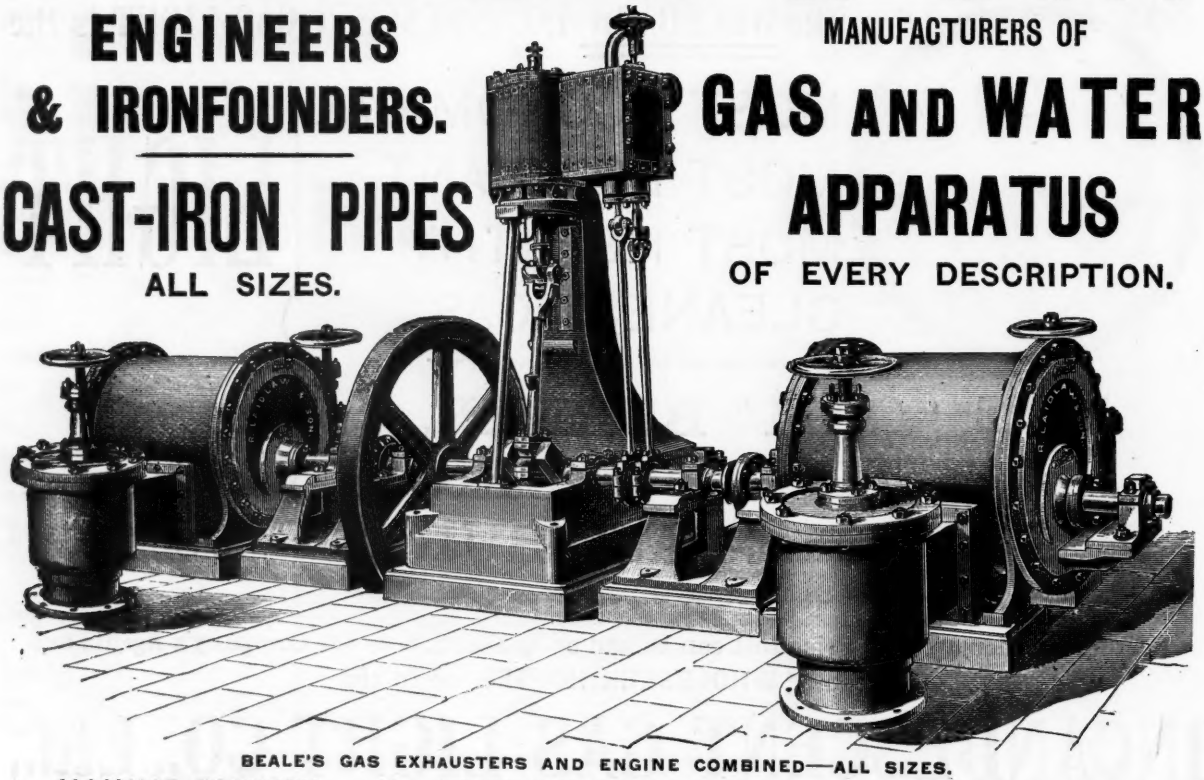
Works: TURNBRIDGE, HUDDERSFIELD, ENGLAND.

R. LAIDLAW & SON

ENGINEERS & IRONFOUNDERS.

MANUFACTURERS OF GAS AND WATER APPARATUS OF EVERY DESCRIPTION.

CAST-IRON PIPES ALL SIZES.



BEALE'S GAS EXHAUSTERS AND ENGINE COMBINED—ALL SIZES.

ALLIANCE FOUNDRY, GLASGOW. | SIMON SQUARE WORKS, EDINBURGH. | 6, LITTLE BUSH LANE, LONDON, E.C.

WEST'S GAS IMPROVEMENT COMPANY, LTD.,

ALBION IRON-WORKS, MILES PLATTING, MANCHESTER.

AND

104, Queen Victoria St.,

LONDON, E.C.

WEST'S

MANUAL

AND

POWER

MACHINERY

FOR

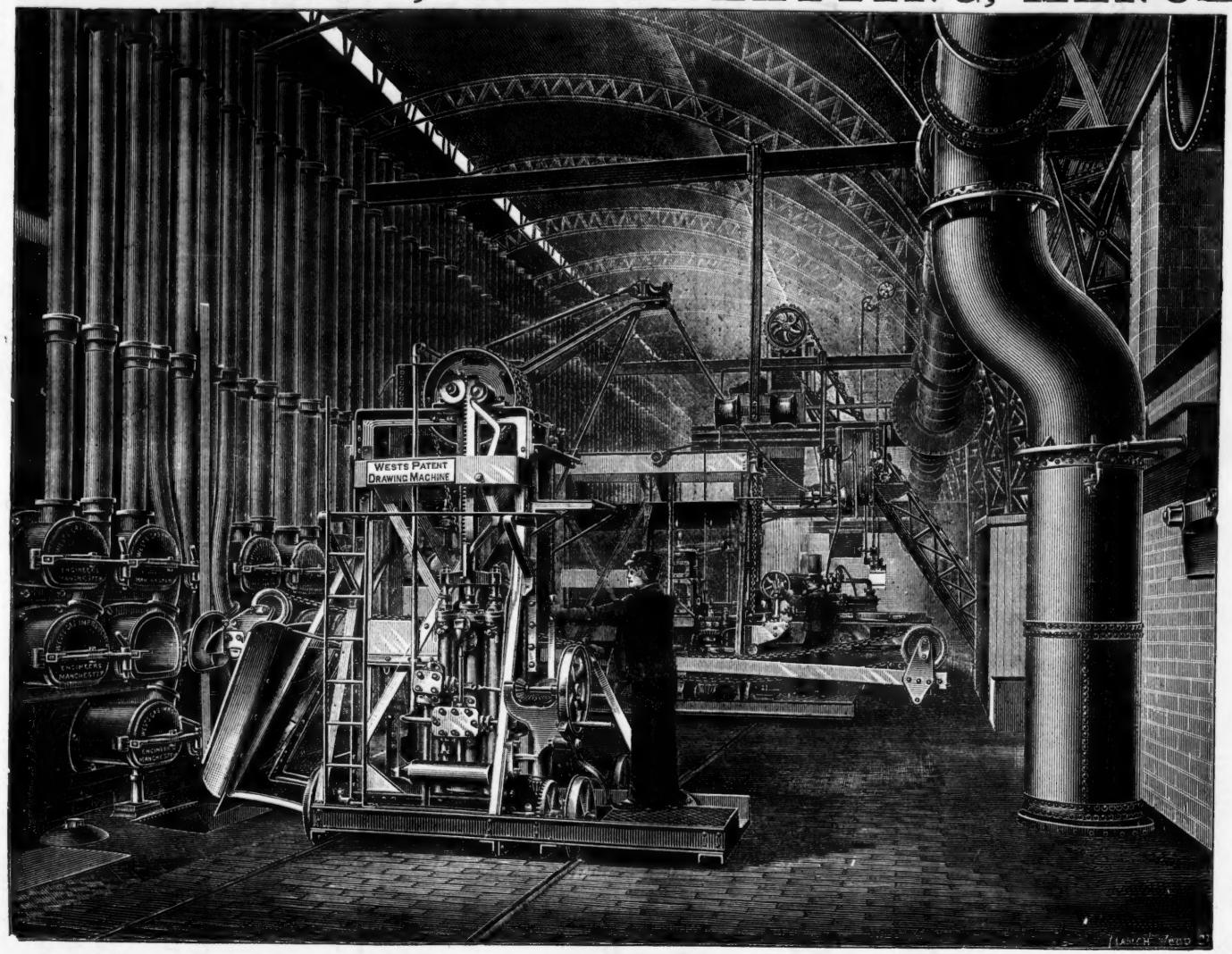
CHARGING

AND

DRAWING

GAS-

RETORTS.



Interior of Retort-House at the Bradford Road Gas-Works, Manchester, showing the Compressed-Air Drawing and Charging Machines.

AND

104, Queen Victoria St.,

LONDON, E.C.

OVER

560,000

LINEAL

FEET

OF

RETORTS

DAILY

ARE CHARGED

AND DRAWN BY

WEST'S

MACHINES.

KIRKHAM, HULETT, & CHANDLER, LD.

3 & 4, PALACE CHAMBERS, BRIDGE STREET, WESTMINSTER, S.W.

PATENT "STANDARD" WASHER-SCRUBBER.

505 of these Machines in use, and several in course of construction at the present date.

Maximum Efficiency, combined with Minimum Back-Pressure and Power required to drive.

Most of the principal, and a large number of the smaller, Gas Companies and Corporations have adopted them, and repeat their Orders when making Extensions.

MARSHALL'S PATENT BATTERY CONDENSER.

This Apparatus gives large and effective cooling area on small ground space, and provides for slow passage of Gas and Water.

Six Batteries recently completed (three at Coventry).

For other Specialities, see last and next week's Issue. Prices, &c., on application to the above Address.

THE WIGAN COAL & IRON CO., LIMTD.,

Are exclusive Owners of the well-known HAIGH HALL & KIRKLESS HALL GAS COAL COLLIERIES, and supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, Cannel Nuts, &c.

Midland District Office: PRINCE'S CHAMBERS, 6, CORPORATION STREET, BIRMINGHAM—Sole Agent: A. C. SCRIVENER.

TELEGRAPHIC ADDRESS: "WIGAN BIRMINGHAM." TELEPHONE No. 200.

London District Office: 6, STRAND, LONDON—C. PARKER & SON, Sole Agents.

TELEGRAPHIC ADDRESS: "PARKER LONDON."

W. J. JENKINS & CO.

GAS ENGINEERS AND IRONFOUNDERS,

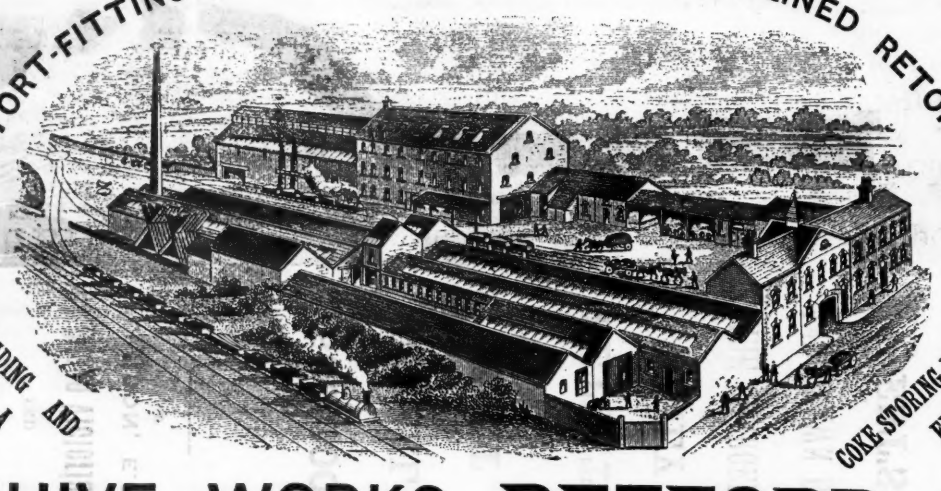
MAKERS OF ALL KINDS OF

PLANT AND MACHINERY FOR GAS-WORKS.

COAL-BREAKERS. COKE-SCREENS.

MOUTHPIECES. LIQUOR-TANKS.

RETORT-FITTINGS, REGENERATOR SETTINGS, INCLINED RETORTS.



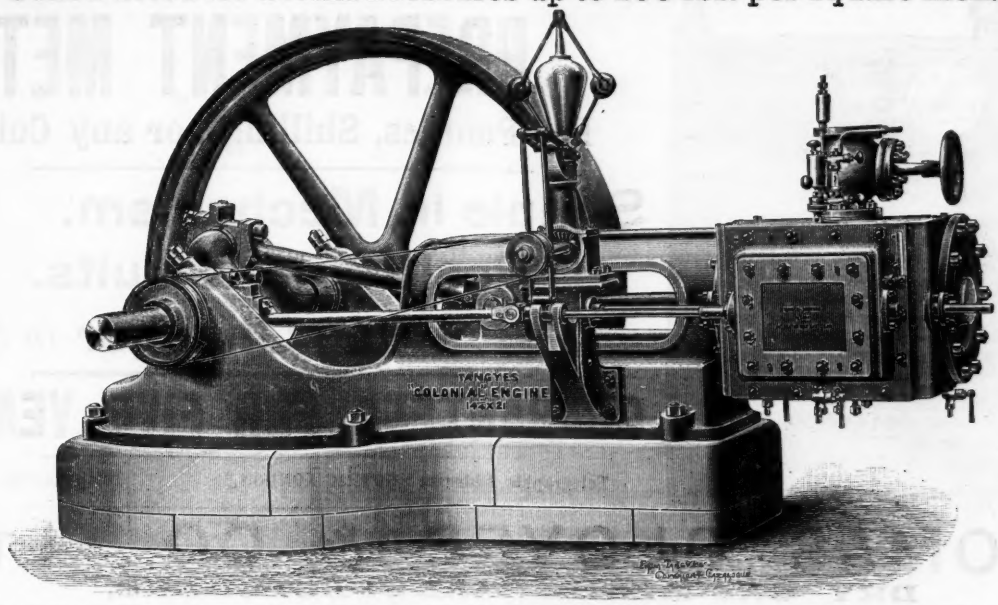
COAL UNLOADING AND CONVEYING A SPECIALITY.

COKE STORING PLANT, ENGINES, EXHAUSTERS, VALVES.

BEEHIVE WORKS, **RETFORD,** NOTTS.

TANGYES'
"COLONIAL" STEAM-ENGINE

Constructed for Steam Pressures up to 100 lbs. per square inch.



Tangyes' "Colonial" Steam-Engine, with the TANGYE-JOHNSON PATENT AUTOMATIC CUT-OFF GEAR. From a Photograph of the 14½ in. by 21 in. size.

PRICES QUOTED ON RECEIPT OF THE NECESSARY DATA.

TANGYES LIMITED, Cornwall Works, BIRMINGHAM.

AND LONDON, NEWCASTLE, MANCHESTER, GLASGOW, SYDNEY, JOHANNESBURG, BILBAO, AND ROTTERDAM.

Telegrams: "TANGYES BIRMINGHAM." *Copyright. Entered at Stationers' Hall. No. 69 E.*

SELF-ENRICHMENT OF COAL GAS

(Shadbolt and Broadhead's Patent).

Two Candle Extra Illuminating Power may be obtained by this Process without the aid of Supplementary Enrichers.

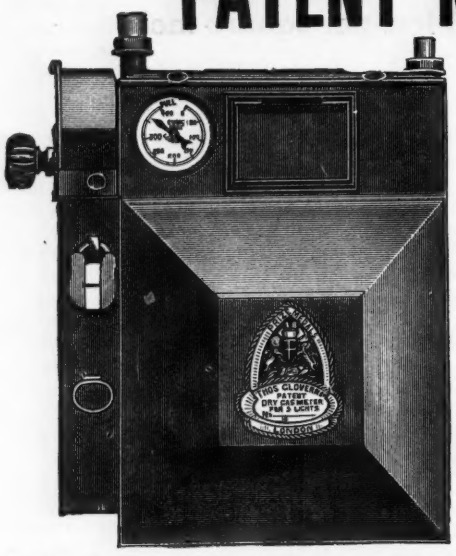
For further Particulars, Prices, and Royalty, apply to the Sole Agents and Licensees—

R. DEMPSTER & SONS, Limited,

ELLAND, YORKS.

THOMAS GLOVER & CO.'S

PATENT NEW IMPROVED PREPAYMENT METER



For Pennies, Shillings, or any Coin.

Simple in Mechanism.
Positive in Results.
Price Changer *in Situ.*

GUARANTEED FOR FIVE YEARS.

Telegraphic Address: "GOTHIC LONDON." Telephone No. 6725.

THOMAS GLOVER & CO., LTD.,

DRY GAS-METER MANUFACTURERS,

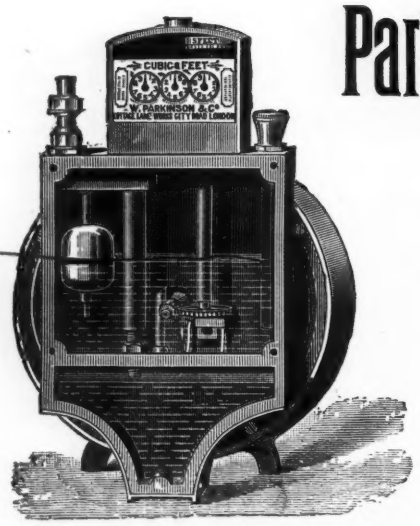
214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

BRISTOL:	BIRMINGHAM:	MANCHESTER:
62, VICTORIA STREET.	1, OOZELLS STREET.	37, BLACKFRIARS STREET.
Telegraphic Address: "GOTHIC."	*Telegraphic Address: "GOTHIC."*	*Telegraphic Address: "GOTHIC."*

W. PARKINSON & CO.

MANUFACTURERS OF WET & DRY METERS.

OLDEST ESTABLISHED FIRM IN THE TRADE.



Parkinson's Cast-Iron Case Meter.

Works with very little friction.

Will stand very high pressures.

Cannot possibly be shut off by sudden increase of pressure; the float being affected by outlet gas only.

Allows for loss of water by evaporation without materially affecting the registration or shutting off the gas.

Unexcelled for Simplicity of Construction, Excellence of Workmanship, and Accuracy of Registration.

COMPENSATING METERS,

In Tinned or Cast-Iron Cases.

COTTAGE LANE WORKS, CITY ROAD,
LONDON.
Telegraphic Address: "INDEX."

BELL BARN ROAD WORKS,
BIRMINGHAM.
Telegraphic Address: "GAS-METERS."

CONTENTS.

EDITORIAL NOTES:—

GAS, LIGHTING, &c.— PAGE

Sir Douglas Fox on Engineering and Mechanics. 583
The Secret Commission System Again 584
The Report and Accounts of the Commercial Gas Company . . 584
A Study in Municipal Meanness 584
The Petroleum Inquiry. 585

WATER AND SANITARY AFFAIRS—

London Government Reform and the Water Question 585
The Quality of London Water—An Appeal to the Local Government Board for a Special Analysis 585

ESSAYS, COMMENTARIES, AND REVIEWS:—

Gas and Water Companies in the Stock Market 586
Electric Lighting Memoranda. 586
Gas Acts for 1896 587
The Detection of Inflammable Gas and Vapour 589
The Production and Utilization of Ammonia 589

NOTES:—

The Inoculation of Soil for Nitrogen 590
Cotton Belt Conveyors 590
Cleaning the Sides of Open Reservoirs 590

TECHNICAL RECORD:—

Eastern Counties Gas Managers' Association—Half-Yearly Meeting at East Retford—
The Construction and Working of Regenerator Settings. By W. J. Jenkins, of Retford. 590
Société Technique du Gaz en France—Notes on Some of the Papers at the Annual Congress 593
British Association for the Advancement of Science. 594
Limiting Explosive Proportions of Acetylene, and Detection and Measurement of the Gas in the Air 595
The Products of Combustion of Coal Gas and their Influence on Health 595
Another Sulphate of Ammonia Works in Scotland 596

REGISTER OF PATENTS:—

Gas-Engines—Gass, A.. 597
Gas-Burners—Holliday, T. 597
Gas-Producer—Clouard, A. 597
Carburetting Air for Illuminating and Heating Purposes—Notkin, N. 597
Generating and Storing Acetylene—Appleby, E., Harris, F. H. . 597
Gas Motors—Dwryea, J. F. 598
Vapour Burners and Oil-Gas Apparatus—Freeny, V. I. (Carmien, P., Yvonnet, A., and Billion, M.) 598
Patent Notices 598

CORRESPONDENCE:—

Lord Rayleight on Light 598
The Permanency of Illuminating Gas 598
Mr. Damon and the Evans Photometer. 599
The Self-Enrichment of Coal Gas 599
Gas Cookers and Coin Meters 599

LEGAL INTELLIGENCE:—

The Patent in Automatic Gas-Retorts 600
Alleged Embezzlement by a Collector 600
Dealing in Stokers' Gloves Alleged to be Stolen 600

MISCELLANEOUS:—

Alliance and Dublin Consumers' Gas Company—The Half-Yearly Report and Accounts 600
Meeting of the Shrewsbury Gas Company. 600
Colonial Gas Undertakings 601
Milton-next-Sittingbourne Gas Supply—The Managership of the Works 601
Commercial Gas Company—The Half-Yearly Report and Accounts 602
The Assessment of the Lancaster Gas-Works 603
Electric Lighting Notes 603
Sheffield Corporation Water Department—Mr. Eaton's Position and Emoluments 604
Birkenhead Corporation Water Supply—Proposed Extensive Purchase of Water-Works 604
The Sleaford District Council and the Water Supply—A Meeting of Ratepayers Ratify the Purchase of the Works 605
Notes from Scotland. 605
Current Sales of Gas Products 607
Coal Trade Reports 607
Gas and Water Companies' Stock and Share List 606

PARAGRAPHS:—

PERSONAL: Mr. H. Davies; Mr. W. H. Troughton; Mr. J. H. Brearley; Mr. G. M'Guire; Mr. William Airth; Mr. F. Gibson; Mr. Harold Baker; Mr. C. Hawksley. 588
OBITUARY: Sir George Morrison 589
A Relic of London's Old Water Supply 586
Additional Capital for the West Middlesex Water Company—The "Holophane" System of Illumination 589
The Adulteration of White Lead 593
Acetylene Motor Cars—Removing the Incrustations from Water-Pipes 595
Condemnation of the Candle as a Standard of Light—Popular Science Lectures in Manchester—Preventing Frauds by the Tilting of Meters—The Use of Water-Meters at Lexington (U.S.A.). 596
New Water-Works for Hollington 598
Water-Works for Ellesmere—The New Well of the Leamington Corporation 599
Gas *v.* Oil for Public Lighting 601
Additional Plant for the Smethwick Gas Undertaking—The Charge for Water for Trade Purposes at Hastings—Leeds Gas-Works Profits 605
Another Water Bill for Eastbourne 606
The Ledbury Water Supply "A Scandal". 607
The Glasgow Dynamitards—Presentation of Water-Works to Charlbury—The Drogheda Water-Works—Seville Water-Works Company, Limited—Strike of Gas Workers in Berlin—Messrs. Sadler and Co., Limited—Proposed Purchase of the Aldeburgh Gas and Water Works—New Water-Works for Masham—Torquay Gas Company 608
The Manchester Corporation and Water Gas—The Assessment of the Lancaster Water-Works—Awards at the Sanitary Congress Exhibition—Gas and Electric Lighting in the Manchester Out-Districts—Sales of Shares 609

EDITORIAL NOTES.

Sir Douglas Fox on Engineering and Mechanics.

THE meeting of the British Association has not been fruitful of fresh matter which we could properly bring under the notice of our specialist readers. At the same time, the scientific and technical journals have been full of more or less interesting reading in the shape of the reported addresses and contributions to the proceedings of the different sections of the Association, some of which we can touch upon without going very far out of our ordinary track. The President of the Mechanical Science Section, Sir Douglas Fox, found a motive for his address in the circumstance that twenty-five years had elapsed since the previous meeting of the Association in Liverpool; and he devoted himself to the consideration of the progress of civil and mechanical engineering during the interval—naturally so momentous in the professional careers of all living engineers. Among the engineering successes of the period were named the perfecting of hydraulic machinery, and of gas and electric plant—facts specifically testified to in the contemporaneous record preserved in the pages of the "JOURNAL." Sir Douglas Foxis, of course, a very eminent personage, and one who has taken his part in furthering the progress of some of those developments of engineering and mechanics of which he spoke. But he has the defect of his quality as a specialist; and consequently many of his general reflections on those branches of engineering in which he is not engaged, are not more pointed or instructive than would be the comments on the same topics of any ordinarily well-informed man. Thus, he appeared to suspend his critical faculty when he was descanting upon the history and prospects of electric and other forms of mechanical traction for street tramways, which is such a burning question for the authorities of our large towns, in order to laud American enterprise in this regard. His remark that similar enterprise in Great Britain is "much hampered by the reluctance of public "authorities to permit the introduction of the necessary "poles and wires into towns," is distinctly unfair to the authorities alluded to, who are at any rate thoroughly in accord with public feeling in hesitating to accept the postulate that such "poles and wires" as Sir Douglas Fox referred to are "necessary" at all.

Sir Douglas Fox did not omit to mention the use of compressed gas for traction purposes; only premising that this application is at present in an experimental stage in this country. He stated that it is claimed to be the cheapest for tramway purposes, his comparative figures per train-mile being: Single-horse cars, 5¼d.; electric cars, with overhead wires, 4¼d.; gas cars, 3¼d. More than this he did not say on this important subject. But his statements are quite enough to commend the gas car to the earnest attention of tramway authorities, who will not fail to notice that most of the special advantages claimed by the speaker for electrical tramways—such as that of lending itself to the requirements of a growing district, capability of easy extension, cheapness of installation, limitation of the effects of breakdowns, and comfortable car appointments—belong as much to the gas car; while the latter, being self-contained, has in this a positive and great recommendation of its own.

One of the most generally attacked of Sir Douglas Fox's declarations was his pronouncement in favour of the early introduction into England of the metric system, for engineering and commercial reasons. He said that "it "behoves all who desire to see England regain her trade to "use all their influence in favour of the adoption of this "system;" and he considered that the willing adoption of the system by physicists and chemists all the world over is an important argument in its favour. This is one of those questions upon which such a person as Sir Douglas Fox speaks with no more authority than anybody else, and in regard to which, therefore, his argument must stand or fall by the evidence he can adduce in its support. This, it must be conceded, is extremely weak. The employment of the metric system for certain kinds of theoretical or laboratory work is no argument whatever for its suitability to the common requirements of every-day life; and the drawback of its unsuitability for mental arithmetical operations and the most natural and obvious subdivisions is a heavy set-off against its simplicity for

certain written calculations and accounts. Upon this head, a contemporary observes: "We should like to ask "Sir Douglas Fox if he or his assistants cube up earth-"work on a decimal or a duodecimal system, or whether if "given any quantity to multiply by 3·125 he would him-"self perform four operations of multiplication and one of "addition, or simply multiply by three, divide by eight, "and add the two results." Such a question is distinctly "gravelling" for metrical enthusiasts.

The conclusion of Sir Douglas Fox's address was most decidedly optimistic. He was careful to lay stress upon the fact that, if English ingenuity and industry are to hold their own, this result will only be attained, first, by meeting with inventive faculty the ever widening and advancing mechanical requirements of the world; and afterwards by adhering rigidly to sound principles of construction, to the use of materials and workmanship of the highest class, and to simplicity of design and detail—that is to say, by the exercise of skill, enterprise, and honest dealing. This is a good message, if not a particularly startling one. The future of the industrial world is likely to come more and more under the power of engineering; but unless truthfulness goes with knowledge, the world will be none the better for all its progress.

The Secret Commission System Again.

At the risk of being supposed to revel in the unsavoury subject, we must find space to return to the action of Sir Edward Fry in regard to the evil of secret commissions. The publication of the first letter from Sir Edward on this subject, in "The Times" of the 12th inst., called forth many communications and representations respecting the commercial evils catalogued by the writer; and he has now published some further remarks which have elicited a "Times" leader summing up the whole matter. Sir Edward touched up both engineers and architects for taking illicit commissions from contractors; and although both of these professions have organizations supposed to be designed to protect or to benefit their members in some way, only the Secretary of the Royal Institute of British Architects ventured to enter into the controversy, and he merely implored Sir Edward to turn his attention more exclusively to those architects who are outside this body. What would the Institution of Civil Engineers or the Royal Institute of British Architects do, anyhow, if some proof were laid before the Council that any member had been guilty of taking an illicit commission? Another correspondent asks about the bankers who get return commissions on the purchase of stock by customers, the lawyers who have "pickings" out of fire insurance premiums, and similar practices that may be described as being at all events on the debateable ground between business and morality. Sir Edward Fry rightly describes the system of secret commissions as "perpetually presenting temp-"tations to the young, the striving, and the inexperienced "in the professions, in trade, and in domestic service;" and he calls the system as cruel as it is degrading. He lays it down that "no one ought to regard the offer of any "bribe in any form as private or confidential, however "much the wrongdoer may strive to put it under the seal "of secrecy. No one can, either in law or in morals, "impose on a third party a duty to be silent as to his "unlawful designs." This is doubtless true; but we imagine that few persons to whom the offer of a secret commission had been made "in the ordinary way of "business," would care to publish their own virtue in refusing it. If this (probably mistaken) diffidence were overcome, the offering of temptations to dishonesty would become a more dangerous practice than it usually is.

Sir Edward Fry thinks the evil of secret commissions is "partly intellectual," by which phrase we suppose he means that, in the minds of some people, there exists a confusion of ideas as to the right and wrong of the practice. This is a correct view of the matter; but it would nevertheless be dangerous to accept fully the dictum of "The Times," that, where there is a doubt as to the legitimacy of a commission, the consideration of whether or not it is to be kept a secret from one of the principals will determine the moral question. An illicit commission does not lose this complexion merely because its existence is tacitly understood, or perhaps overtly acquiesced in for some reason or other. If we do not misunderstand "The Times'" remarks on this head, the traditional roguish lackey of old French romance, who did not permit his master to be robbed by anybody but himself, would be, according to this doctrine, a white-washed character, if it could be shown—which would be easy—that the master was perfectly wide-awake to the whole arrangement. A return to sounder ground is effected in the observation: "A healthy conscience and a robust "common sense need seldom trouble themselves about "the finer questions of casuistry. Most men know "when they are doing wrong; and in the vast majority "of cases, the fact that they are doing it, and know that "they are doing it, when taking or giving a secret com-"mission, is their only motive for secrecy. . . . It is "idle to plead the custom of business, and to say that the "individual cannot afford to be more honest than the mass. "*Cosi fan tutte*"—which might just as well have been Englished into "they all do it"—"is no defence at all, and "a very poor excuse for a man of sensitive conscience."

As for the formal remedies proposed, there is not much that is new to be said. It is a crime already to offer a bribe to various public officials; and it is difficult to see why the same law should not be made to apply, under careful enactments, to the offer and the demand for what, in ordinary business, is either intended for a bribe or extorted as blackmail. Those who would undertake the arduous and thankless task of trying to extirpate this evil from British industry and commerce have "a long row to hoe." But it is something gained already that public opinion is set straight towards this end. Human perfection is a plant of very slow growth, under the most favourable conditions; and it is a great thing when it can be recognized as growing at all.

The Report and Accounts of the Commercial Gas Company.

The report of the Directors and the statement of accounts of the Commercial Gas Company to be submitted to the proprietors next Thursday will be found in another column. According to the stereotyped form employed to convey the information, the revenue account shows a net profit for the half year of £43,249; making, with £343 received for interest, £43,592. This, added to the amount brought forward from the previous half year, produces £58,708. Deducting £3712 for interest on the debenture stock, there remains standing to the credit of the net revenue account a balance of £54,995 available for division. Accordingly, the Directors recommend the declaration of dividends after the rate of 13½ and 10½ per cent. per annum on the old and new stocks respectively; the difference between the declared dividends and the authorized amount divisible, having regard to the price of gas, being carried to the reserve fund. For the corresponding half of last year, the net profit was £48,680; and the balance standing to the credit of the net revenue account amounted to £68,585. During the year, therefore, the Company's finances have suffered to the extent of £13,590; the price of gas remaining the same—2s. 6d. per 1000 cubic feet. By the revenue account, it appears that the Company's gas-rental has slightly fallen; the return being £133,035, as against £133,633. Notwithstanding this, the meter and stove rental continues to grow; so that the difference in question must be attributable to the mildness of the season as compared with the late winter of 1895. Upon the top of this check comes a loss of £7080 upon coke, and a diminished return from other residuals. On the other hand, manufacture cost £4213 less—coal being cheaper. There is but little change in the other entries. From the balance-sheet, it appears that the Company owe their bankers £58,000; the capital account being overdrawn by £11,594—the fresh expenditure for coin meters and fittings amounting to £6548. The stock of coke is heavier than it was a year ago; and there is also more of the other residuals in hand, although not to any important degree. The interest of Thursday's meeting will mainly centre in what the Chairman, Mr. J. Blacket Gill, may have to say about the capital account.

A Study in Municipal Meanness.

The parsimony of municipalities, as displayed in cutting down the salaries of their responsible officers, has often been denounced in these columns; and it was with mingled pleasure and sorrow that we read in last Friday's "Pall "Mall Gazette" a brief article entitled "A Study in "Municipal Morality," which goes to show that gas managers are not the only sufferers from this municipal shortcoming. The article purported to be a truthful account of the proceedings of the Bradford Town Council in the matter of filling the office of Town Clerk, recently

vacated by the death of Mr. M'Gowen; and there is no reason whatever to suspect the writer's veracity, inasmuch as his story is on the face only too probable. It appears that the Bradford Corporation originally offered a salary of £1500 a year with the appointment at their disposal, which attracted a large number of applicants, of whom only one satisfied the Committee of Selection. This gentleman was Mr. R. Hill-Dawe, the Town Clerk of Hull, who was no sooner reported as the chosen of Bradford than his own Corporation rose to the emergency, and increased his salary to that which had tempted him to contemplate making a move. Having been disappointed of Mr. Hill-Dawe, the Bradford Corporation Committee fell back upon their short list, and picked out two names for submission to the Council. Both gentlemen were already Town Clerks of fair repute, and in every respect eligible for the appointment. The Corporation, however, did not want to pay either of them £1500 a year; and accordingly the Committee's nominations were at once quashed in full Council meeting. A fresh advertisement, with the salary reduced to £1250 a year, was forthwith issued; and a week later one of the candidates put up by the Committee accepted the appointment on the revised and reduced terms. The "Pall Mall Gazette" waxes sardonically humorous over this business. But the incident, if correctly reported, is not one that any well-wisher of Bradford could find amusing. There must have been a singularly stupid spirit abroad in the Corporation on the painful occasion when they repented of offering £1500 a year for a Town Clerk, and decided to take one at £250 a year less. The latter sum does not seem a high price at which to sacrifice all the dignity even of the Bradford Corporation. There is some humour, as our contemporary perceives, in the circumstance that Hull has to pay £300 a year more for its Town Clerk, while Bradford saves £250 a year on the deal. Regarded from the high ground of public policy, however, the whole story is a miserable one, and is certainly not reassuring as to the drift of Municipalism in that part of the country.

The Petroleum Inquiry.

For a long time we have been labouring under a sense of the painful duty of saying something in these columns about the work of the Parliamentary Committee on the great petroleum question; but the practical impossibility of discerning any drift in these protracted proceedings has prevented all interim comments on the inquiry. Our readers will know in a general way that a Committee has been sitting to collect evidence respecting the safety or otherwise of the present methods of trading in and using mineral oil for lighting purposes; that an enormous amount of evidence has been laid before the Committee; and that the close of the session put a temporary end to their labours. We cannot do better, by way of summarizing these proceedings, than adopt the editorial remarks of our contemporary "The Ironmonger" on this subject. "In all probability, no more contradictory evidence was "ever given to any similar body. Experts of all sorts, "sizes, and nationalities have been brought forward on "behalf of the various and conflicting interests concerned, "and it has been demonstrated with the utmost confidence "and skill: That the oil is at fault, that there is no "possible fault with the oil; that safety is only to be "found in raising the flash-point, that the flash-point is "the safest possible; that metal founts for lamps are "best, that glass founts are best; that accidents are very "rare and trivial, that accidents are frequent and "alarming; that wick-tubes must be used, that wick-"tubes cannot be used; that the Scotch oil folks are "pushing the agitation for a higher flash-point, that the "Scotchmen are quite innocent of any such intent; and "that a great variety of other things are black, white, or any "other colour, according to the point of view of the "witness and the interest he represents." This is all quite true; and we agree in the further observation that there does not appear to be any reason why the Committee, if reappointed next session, should not go on taking the same kinds of evidence until further notice. In the meantime, it is stated that the lamp manufacturers are organizing, and will in future be in a better position to defend their interests. The contest for popularity between lamp oil and gas will go on pretty much on the usual lines, subject only to the incursion of the coin-freed meter into the region where oil once reigned without an effective rival.

WATER AND SANITARY AFFAIRS.

General C. E. Webber, to whose first letter on the problem of London Government Reform and the Water Supply we referred three weeks ago, has returned to the subject in the columns of "The Times," and gives the outline of his plan by which the expense of buying up the Water Companies is to be superseded by a system of control. It is one feature in this plan that compensation is to be given to the Companies for any curtailment of their powers which would ensue from its adoption. We fear the Companies stand very little chance of getting that kind of favour, or rather we might say that measure of justice. As for the machinery which is to be set in motion, this is spoken of as "a separate controlling body "to deal with the whole question." The necessary Act is to "empower the Local Government Board to call into "existence the new controlling body and to organize its "constitution." This mode of proceeding seems open to the objection that the new authority, although spoken of as "representative," might prove to be little else than an adjunct of the Local Government Board—somewhat after the fashion in which it was proposed to tack on a Statutory Committee to the London County Council. In other words, we might as well have the Board without the controlling body. The moving power proposed by General Webber is a conception which shows the force of our remark when discussing his first letter: "Control, if "more of it is wanted, can be carried out by the existing "authorities, without the introduction of any revolutionary "scheme." There is control already; and the question arises how much farther it is needful to go in the same direction. The creation of a new controlling body means additional expense; and General Webber can do no less than propose that the new authority shall have power to levy a rate to defray expenses, as also to borrow money to pay compensations.

The whole discussion with regard to the water supply of London is based on the notion—now prevalent with reference to a more momentous subject—that it is necessary to "do something." It has been looked upon as a foregone conclusion, that the Metropolitan Water Companies must either be bought up, or a new and extended system of control introduced. We submit the system of control can be extended without setting up anything essentially new. There is no need for violent change, whether for purchase or control. For what are the people of London asking in regard to the water supply? If they are eager to have it on easier terms, there is no probability that any increased cheapness will be accomplished either by the purchase of the undertakings or by the creation of a new authority. If they want further guarantees for the purity of the supply, the means for that purpose are close at hand. A factitious agitation has been got up concerning the water supply, which is far more likely to prejudice the public interest than to promote it. The Government feel called upon to take the matter in hand, but are doubtless conscious of the great difficulty by which they are beset. They cannot fail to be well aware that some modification of the present system which regulates the water supply of London is all that can be undertaken with any advantage to the consumer. Yet it is evident that the Imperial power is expected by many people to interpose with some marvellous scheme, by which the Water Companies shall be superseded, and the conditions of the supply entirely changed. As affording some counterbalance to these unreasonable demands, it is satisfactory to observe signs of a growing conviction in the public mind, that to buy out the Companies would be unprofitable both to the consumer and to the ratepayer. With respect to control, we would remark that the request for its exercise should be accompanied by a due regard for the rights of proprietorship.

Our contemporary "London," having brought a charge of "criminal neglect" against the Directors of the East London Water Company, now sees fit to launch an accusation of "gross neglect" against the Local Government Board. The present complaint is that, the Camberwell Vestry having caused a sample of water to be taken from a main in the Camberwell Road, the Local Government Board have refused to analyze it. This is considered to be a departure from duty; the Board being "the Water Examiner "for the Metropolis." More correctly speaking, the Board are required to appoint "a Water Examiner, being a "competent and impartial person." This appointment the

Board have made in the case of Major-General Scott, whose duty it is, as directed by the Board, to examine the water supplied by any Company, in order to ascertain whether or not they have complied with the requirements of section 4 of the Metropolis Water Act of 1852. This section specifies that "every Company shall effectually "filter all water supplied by them within the Metropolis "for domestic use, before the same shall pass into "the pipes for distribution." General Scott makes a monthly report, in which full particulars are given as to the means adopted by the Companies for the filtration of the supply, before the water is sent into the mains. In addition, he cites the analyses made by Dr. Edward Frankland on behalf of the Local Government Board, with respect to the supply before and after it undergoes filtration. In availing themselves of the services of Dr. Frankland, the Board have gone beyond the mere appointment of a Water Examiner. They have thus the aid of a water analyst, possibly in accordance with the power conferred upon them, by which they "may at any time, "if and when they think fit, appoint a competent person "to inquire into and report on the quality of the water "furnished by any Company." Dr. Frankland's report respecting his analyses and bacteriological examinations appears, as our readers are aware, monthly in the reports of the Registrar-General, and subsequently in the report presented by General Scott, besides which an extended annual report is addressed to the Registrar-General, and is repeated in the yearly Blue-book issued by the Local Government Board. Dr. Percy Frankland analyzes the water supply of the Kent Company.

From the foregoing statement, it will be seen that a very vigilant eye is kept upon the quality of the water supplied to the Metropolis. There is, moreover, a monthly report on the water, for very nearly every day, prepared by Mr. Crookes and Professor Dewar, which is presented regularly to General Scott, and duly published by him, besides being issued in a separate form. In fact, the London Water Supply is analyzed and reported upon right and left, by authorities possessing the highest qualifications for the purpose After all this, a sanitary inspector goes and draws a bottle of water from a main in the Camberwell Road, and because the Local Government Board cannot see any necessity for analyzing such a sample, taken under conditions admitting of some degree of doubt as to their completeness and accuracy, the Department is denounced as being guilty of "gross "neglect." It is even proposed to move all London on the subject, by calling on the Vestries and District Boards throughout the Metropolis, together with the County Council, to bring pressure to bear on the Local Government Board, so that "this important question," relative to a bottle of water obtained in the Camberwell Road, shall be laid at rest. On this plea, every Vestry and District Board in London may get its bottle of water, and request the Local Government Board to have it "analyzed." Supposing this were done, what more would be learned than is already known? and might we not have some curious results from samples taken unscientifically? If the Camberwell Vestry are so very eager for hunting down microbes, a promising field awaits them among articles of food. At the recent meeting of the British Association at Liverpool, a paper was read by Dr. Kanthack, stating that half a million of germs may be found in a cubic centimetre of milk, while in sandwiches they are "too "numerous to count." Oysters teem with them; and ices vended by a fashionable confectioner have from ten to fourteen millions of microbes in a cubic centimetre. If, on the other hand, the Camberwell Vestry rely upon a chemical test, they need trouble themselves no further, for chemical analysis proves nothing against London water. Strange to say, this is what they seem to demand.

A Relic of London's Old Water Supply.—During some excavation work which has been in progress in Piccadilly, the workmen have come upon a number of trunks of trees, about 12 feet in length, from 12 to 15 inches in diameter, and bored throughout with a circular passage 6 inches across. They are interesting relics of the old system of supplying water in London; and when they are compared with the mains now required, they afford striking evidence of the growth of this important work. These wooden pipes are more than a century old; and it is assumed by the "Daily Graphic," which gave publicity to the discovery, that they probably belonged to the old Chelsea Water-Works.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 606.)

THE past week opened with the Stock Exchange in a very sensitive condition, although nothing was immediately perceptible to produce serious agitation. But apprehension regarding the political situation soon set in again; and movements of gold foreshadowed a further rise in the value of money. Realization of the gilt-edged class was renewed, with the natural consequences that the prices of the best things are again the principal sufferers. The situation proved unfavourable enough to spoil the new Spanish loan; the price not being good enough for the underwriters. The settlement this week, especially of accounts in speculative markets, gave rise to some anxiety. While almost everything else was put down, there was a brighter side to the American market, as the prospects of the silver maniacs became darker. The Bank of England rate was raised to 3 per cent. on Thursday; but the necessity was clearly foreseen early in the week, and so it was taken calmly. There was a very fair amount of business done in the Gas Market. Prices are naturally rather lower, but not much; for Gas securities are a dangerous class to take liberties with, and "bears" are apt to get caught sometimes when they do. In Gaslight issues, the "A" stock kept pretty active every day. Though the quotation was put down a couple of points, the prices at which business was done never varied much all through the week; and the closing figures were as good as the opening. The price never strayed far from 307 either way. There was not much done in the secured issues; and there was no throwing them on to the market. A fair amount was done in South Metropolitan; and the figures looked as if they were gradually hardening, though we shall probably have to wait a long time before we see again the prices of a fortnight ago. Commercials were untouched, for there was nothing to touch. The Company meet on Thursday—their usual belated date as prescribed by the wisdom of Parliament—and will declare the same rate of dividend as for several past half years. The usual quietude prevailed among the Suburban and Provincial Companies; and quotations did not move. The general depression affected the Continental undertakings to a slight extent; and Imperial and European went back a little. There was no movement among the rest, except an advance in Cape Town. Business in Water was at a very low ebb, and the tendency was rather flat in these as in other securities of the highest class; but the fall in prices was only slight.

The daily operations were: Business in Gas was not very active on the opening day; and the old prices held good—quotations not moving. Transactions were even more limited on Tuesday; and the tendency was not favourable, Gaslight "A" and Imperial Continental being each 1 lower. In Water, Lambeth and Southwark receded 2; and East London and Grand Junction, 1. Wednesday's dealings in Gas were all at steady figures; and quotations closed unchanged. Southwark Water fell 1 more. On Thursday, there was a fair bit of business in Gaslight "A," and the price was good enough to bring in some support. Cape Town rose ½. In Water, New River debenture fell 2. Friday was less active; and Gaslight "A" was put down 1. European also fell ½. Saturday was quiet; but prices were fair, and quotations closed unchanged.

ELECTRIC LIGHTING MEMORANDA.

Mechanical Haulage for Tramways—An Unfavourable Report on the Trolley-Wire System—Mr. Sturgeon on Mechanical Haulage—The Brush Report.

THE question of mechanical haulage for tramways, as recent observations in the columns of the "JOURNAL" abundantly testify, is just now in a critical stage. The electrical interest is trembling on the verge of what must prove to be either a considerable extension of work in this direction, or another great disappointment. So far as the tramway interest is concerned, it may be said that the traction question has not gone any farther towards a solution than a general acceptance of the proposition that "something will have to be done" in the way of superseding horse haulage in the largest centres of population. This understanding, of course, gives their opportunity to those who are interested in different systems of mechanical traction. It is only of a piece with their habit of pushing their claims to the inheritance of the entire industrial world, that the electricians should pretend, as they actually do, to have the future of tramway working in their own hands; but inasmuch as they perceive the vanity of talking about the tramway working of the future, in the ears of those who want something better in this line here and now, they have committed themselves definitely to the claim for the "trolley-wire" system that it is everything that heart could desire for the purpose to which it is applied. We are continually being assured that the rest of the world ought to take the fact that the trolley wires dominate every city in the United States as constituting irrefragable evidence that the problem of the mechanical working of tramways has been triumphantly solved in this manner; and we are further told

that it is hopeless to seek for any better solution, whether we like the trolley-wire system or not.

Here arises the difficulty, which electrical advocates have not yet been able to overcome, of demonstrating that the trolley-wire system is in itself a really admirable thing, and that its extension through the United States is the natural result of its possession of valid claims to respect as a mechanical device. There is more than a suspicion abroad that the trolley wire has been forced upon America by means which dispensed with the proof of mechanical fitness; and the fact of the long-suffering people having in a degree habituated themselves to the arrangement, is no argument in favour of its indefinite repetition. English electrical journals have published attractive views of tramways equipped with the trolley-wires, in order to show that the system does not spoil the aspect of wide thoroughfares running through parks, &c. But these carefully-selected prospects do not help one to realize what the effect of the system would be upon the crowded centres, with their numerous and congested crossings, where good mechanical tramway working is most needed. An interesting insight into the views entertained as to their new tramway service by Americans who are not engaged in the electricity business, is afforded by the report of a Committee appointed last year by the International Association of Fire Engineers to investigate the subject of electrolysis as occurring in gas and water pipes laid in the neighbourhood of street railways worked by the single trolley system. The Committee reported that in their unanimous opinion "the method of distributing electric currents to street-car motors by means of the overhead single trolley and feed wires, track, and supplementary wire and ground, is a menace to the water and gas systems of every town and city where such trolley systems are in operation." They also asserted that the overhead wires are a serious and dangerous obstruction to fire departments in the execution of their duty; often causing serious delays, as they render it next to impossible to elevate ladders and water-towers until they have been removed. And after having been cut or broken away, the wires are almost as dangerous as before, owing to the way in which they get mixed up with one another. Though several remedies have been proposed for preventing the rapid destruction of gas and water pipes by electrolysis, the Committee believe that only one secure way is open to attain this object—the discontinuance of the use of the rail and ground as part of the electric circuit, and the substitution therefor of a metallic conductor with no ground connections.

The double-wire overhead system is, however, intolerable for mercantile or residential sections of populous towns. If we must have electric traction for tramways in such neighbourhoods, there is nothing for it but a well-constructed underground conduit system. But this is something that electricians are by no means keen on adopting. It is about as much as they can do to work even an overhead single-wire trolley system to commercial advantage, where any regard must be had to the amenities of the district and to the general character of the service. Mr. J. Sturgeon had some nasty points to urge in this regard, in his paper on "Mechanical Haulage," read at the last meeting of the Tramways Institute. After a trolley-wire plant has been laid down—not a cheap business, if the work is properly done, with cars that can be depended upon to start loaded under all possible conditions—the wear and tear soon assumes serious proportions. All kinds of electrical plant, says Mr. Sturgeon, involve heavy upkeep, and are subject to rapid depreciation. This appears very conspicuously in the case of tramway haulage plant. "The Roundhay Road plant, after only four years' service, has been condemned by Dr. Hopkinson as not worth taking over by the Leeds Corporation. This is depreciation with a vengeance." Mr. Sturgeon declares that he has never yet been able to pin those supposed to be "in the know" to a direct answer to the questions: Where, in view of the working conditions as explained, does the saving or advantage come in? What special charm is there about electricity that makes 3-horse power in steam cost less when applied to an electrical purpose than 1-horse power applied to drive a vulgar cable? It is not necessary to believe in the adequacy of the cable system of tramway working for all conditions and localities, to feel the force of Mr. Sturgeon's indictment of electricity in this connection. But to return to the report of the American fire experts, as our space is limited. The conclusion they arrive at is that the equipment of tramways on the overhead single-trolley system is obnoxious to the general welfare, and should be prevented. Where it has been admitted, the warning is given that the water-distributing system may fail at any moment, and that "gas-pipes may become so weak from this cause that they may pour their contents into the soil, dwellings, stores, warehouses, and factories, to such an extent as to endanger these structures and the lives of the inmates as well." This picture may be considered as somewhat highly coloured. But it is difficult to conceive what motive the fire underwriters of America can have to unfairly attack any system of tramway working.

The report of the Directors of the Brush Electrical Engineering Company, Limited, for the year ending June 30, has been issued, and the principal portions will be found in our "Electric Lighting Notes." It will be seen that the net balance of profit is £4615; and the Directors express regret that it is not larger. We can only now briefly call attention to the report.

GAS ACTS FOR 1896.

According to our usual practice, we give hereunder an abstract of the chief provisions of the gas legislation of the present year.

The Aldershot Gas and Water Act recites that the Company's share capital under an Act of 1866 and two subsequent Provisional Orders amounts to £74,500, with power to borrow £17,450; and the total actually raised and borrowed comes to £84,513. New "E" capital to the extent of £60,000 bearing a 7 per cent. ordinary or a 5 per cent. preference dividend is authorized, with power to borrow one-fourth the amount raised. The construction of a tramroad of the ordinary railway gauge is sanctioned, to connect the Alton and Winchester branch of the London and South-Western Railway with the Company's gas-works. At their own expense, the Company are to construct a siding from this tramroad to the sewage works of the Aldershot District Council, who are to have the use of both tramway and siding; the latter being worked by horse power only. The acquisition by the Aldershot Company of the undertaking of the North Camp and Farnborough District Gas Company is sanctioned, according to the terms of a scheduled agreement. Gas-fittings are to be removable from unoccupied houses.

The Bexhill Water and Gas Act enables the Company to raise £46,000 of additional 7 per cent. capital for the general purposes of their undertaking, with the usual borrowing powers. Additional lands are permitted to be acquired by agreement, but not to be used for the purpose of manufacturing gas or residual products. The Company may apply for an Electric Lighting Order, and give effect to the same out of the moneys authorized by the Act.

The Bournemouth Gas and Water Act authorizes the Company to take additional lands for the construction of gas-works; and to raise £300,000 by the creation and issue of new 7 per cent. shares or stock, carrying the usual borrowing powers. Any mortgage or debenture stock is to be offered by auction or tender. New gas mains and services are required to be placed at a minimum depth of 2 ft. 6 in. clear below the surface of the ground. Where the Borough Surveyor superintends work done by the Company, the Corporation have a claim to be paid a reasonable sum for his services. If the Company and a consumer differ regarding the registration of a meter, such difference is to be referred to an Arbitrator to be appointed by the Board of Trade. The gas limits of the Company are extended. The period of error in defective meters is limited. The quality of the gas supply as from the beginning of next year is to be 15½ candles, tested in the town. Prepayment for gas may be demanded in certain cases. The Company may apply for an Electric Lighting Order, and devote their funds to the purpose of such application.

The British Gaslight Company, Limited (Norwich), Act authorizes the expenditure by the Company upon their Norwich undertaking of the additional sum of £85,000, subject to the provision that £33,000 of this amount, and no more, may be so expended out of the capital stock of the Company, and bear a 5 per cent. maximum dividend; the balance to be borrowed money at not exceeding 4 per cent. interest. Of the moneys authorized to be spent under the Act, the first £40,000 must be raised on loan; and all moneys must be borrowed on the best terms obtainable at the time being. Additional lands are to be acquired, and the works of the Company extended. As from the end of the year, 15-candle gas, free from sulphuretted hydrogen, and containing not more than 25 grains of sulphur and 5 grains of ammonia per 100 cubic feet, is to be supplied. No penalty is to be incurred if it can be shown that any deficiency of illuminating power or excess of sulphur was occasioned by unavoidable cause or accident; or in the case of an excess of sulphur, that the excess amounted to 2 grains on the average of six consecutive week days, or 5 grains upon any one day. The Corporation are to have power to appoint and remove an Auditor of the Company's accounts. Such audit is to be held in London. The remuneration of the Auditor is to be fixed by the Corporation; the Company contributing 30 guineas per annum to the amount. A copy of the accounts is to be forwarded by the Company to the Registrar of Joint-Stock Companies, under a penalty of £2 per day for default; a like penalty being incurred by every Director and Manager of the Company who knowingly and wilfully authorizes or permits such default.

The Cheltenham Gas Act recites that the authorized capital under former Acts amounted to £155,000 of stock, and £27,500 of debenture stock; there being no mortgage debt. As from the beginning of next year, all classes of existing stocks are to be consolidated into an equivalent amount of uniform 5 per cent. stock. New 5 per cent. capital to the extent of £80,000 is sanctioned, with the usual borrowing powers, all under the auction clauses. The quality of gas is to be 15 candles, taken on the average of three consecutive tests in one day, between the hours prescribed by section 29 of the Gas-Works Clauses Act, 1871. The sulphur limit is 25 grains; the testing-place to be within a radius of 200 yards from the present Municipal Offices. The gas supplied to the photometer in the testing-place is to be taken from a main in ordinary use. The Company are empowered to construct a railway connecting their works with the Midland Railway, to be used solely for their our purposes. Additional lands may be acquired compulsorily, but certain

College lands only by agreement. A public thoroughfare is to be stopped up.

The Colwyn Bay and District Gas Act incorporates with statutory powers a limited Company formed in 1883 with a share capital of £8000, and £2000 borrowed money. The Company in 1884 obtained a Provisional Order limiting their district of supply to the parishes of Llandrillo-yn-Rhos and Eirias, and their capital to the amount named. The Act enables the Company to raise £20,000 additional 7 per cent. share capital, with power of conversion into stock when fully paid up; and to borrow one-fourth of the amount so raised. The standard price for 15-candle gas is 5s. per 1000 cubic feet. Five per cent. interest is to be paid on consumers' deposits. Power is given to the District Council to purchase the undertaking at a price to be determined, failing agreement, by arbitration under the Lands Clauses Acts, including the costs. Additional gas lands are to be acquired compulsorily within three years.

The Cowes Gas Act incorporates with statutory powers a Company formed under a deed of settlement in 1846 for supplying gas in the town of Cowes and its vicinity. The present nominal share capital of the original Company consists of £14,830, of which £13,430 is paid up, and there is no mortgage debt. The works were established upon leasehold land, which the Company are now authorized to purchase. The limits of supply are the parishes of Cowes and Northwood in the Isle of Wight; and among the general purposes of the Company is included that of furnishing electric apparatus for lighting. It is provided that the Company shall not, except in case of emergency, without the consent of the District Council, open any street within the Cowes district for the purpose of laying new mains during the months of July and August. The capital of the Company is raised to £33,430, whereof £20,000 is additional 7 per cent. The original capital of £13,430 is to bear 8 per cent. The sum of £3357 is to be borrowed in respect of the original capital, and one-fourth of the amount of the new capital as raised. The standard price of 15-candle gas is 4s. per 1000 cubic feet; and discounts not exceeding 10 per cent. are allowable to consumers in consideration of prompt payment or large consumption. The period of error in defective meters is limited. Power is given to supply gas in bulk, but not in the district of the East Cowes Gas Company, Limited, without this Company's written consent. If the District Council shall introduce a Bill into Parliament, and *bonâ fide* promote the same in any of the next three available sessions, for power to purchase the undertaking, the Company are not to oppose such Bill except in so far as may be necessary in order to protect themselves. In ascertaining the sum to be paid in the event of a transfer of the undertaking under this provision, the Arbitrator is to include the costs of obtaining this Act, but is not to have regard to the fact of the Company being incorporated by Act of Parliament.

The Guildford Gas Act consolidates the capital of the Company into 5 per cent. stock amounting to £74,656, whereof £4056 is preference stock bearing a fixed dividend at the same rate. Authority to raise additional capital to the extent of £75,000 is conferred, with the usual borrowing powers. The Company may construct within five years a railway connecting their works with the London and South-Western Railway goods yard. Additional lands may be acquired compulsorily, with permission to take only portions of certain lands and buildings. Gas of 15-candle power is to be supplied under a pressure of not less than 8-10ths of an inch of water; and it is to be taken from the main as near as may be to the junction with the service-pipe. The Company may supply gas in bulk to neighbouring public authorities and others; and they may apply for an Electric Lighting Order. The standard price of gas is 3s. 6d. per 1000 cubic feet within a radius of two miles from the gas-works entrance, and 4s. per 1000 cubic feet beyond, subject to the sliding-scale rising and falling 1s. 3d. per cent. in every half year for 1d. per 1000 cubic feet.

The Ilfracombe Gas Act converts the old capital of the Company, amounting to £18,375, into £25,924 of consolidated 5 per cent. stock, whereof £17,190 is preference stock bearing a fixed dividend at this rate. Additional capital is authorized to the amount of £40,000, with borrowing powers to the extent of one-third. The borrowed money is not to be converted into capital bearing a higher dividend than 4 per cent. Gas of 15-candle power is to be supplied at a maximum price of 4s. 6d. per 1000 cubic feet. The limits are extended to include the parishes of Morthoe, Berrynarbor, and Combmartin, provided that if, within a certain period of time, the Company do not lay a main as far as High Cross in the latter parish, their statutory privileges in the parish will not hold good. New gas lands are to be acquired, and the existing gas-works discontinued within four years from the completion of the new station. A breakwater and other foreshore reclamation works are authorized, including a quay wall, for the use of which dues are payable. The Company may apply for an Electric Lighting Order; defraying the cost of the application out of the moneys authorized to be raised under the Act.

The Newcastle-upon-Tyne and Gateshead Gas Act provides for the creation and issue by the Company of new capital to the amount of £425,000, not to bear more than 5 per cent. preference dividend. Four per cent. debenture stock is to be issued in the proportion of one-third of the amount of stock raised. Additional gas lands are to be acquired; necessitating the construction of a bridge over, and an archway under, the Riverside Branch of the North-Eastern Railway. Trunk mains may be laid from the new site through certain roads outside the Company's district of supply, subject to notice to the Walker and Wallsend Union Gas Company. Precise provisions are made with regard to the public lighting of Newcastle and Gateshead, according to which the Company are to provide and erect free of charge all public lamps complete from service to lantern inclusive, except burners, in such positions as the Corporations may direct. The burners used in the public lamps are to be provided by the Corporations. So long as the Company maintain the lamps, they are also to fix the burners; and when the Corporations maintain the lamps, they will also fix the burners. Public lamps are to be changed from one place to another as directed by the Corporations, at a charge of 15s. each, or 7s. 6d. if the lamp is not to be re-erected. It is provided that, if more than 200 lamps are discontinued in Newcastle, or 75 lamps in Gateshead, in any one year, the Company will receive 10s. extra in respect of every such additional lamp. The price of gas supplied to the public lamps is to be the lowest charged for the time being to any consumer. Lamp lighting, cleaning, and maintaining is to be done by the Company, who are to be repaid the actual expense by the Corporations. Any meters or special lamps are to be paid for by the Corporations, who may take over the lighting and care of the lamps on giving six months' notice. With respect to the illuminating power of the gas, certain alterations in the provision of the testing-places are sanctioned. Until the new works are erected, 15⅝-candle gas is to be supplied; but from and after that period, the gas is to be of 16-candle power, tested on the works, and 15½ candles in the town.

The South Metropolitan Gas Act provides for the conversion, as from Aug. 12 last, of all the Company's old stock issues into a uniform 4 per cent. consolidated stock upon terms set out in the text, which may be summarized as follows: £2,190,000 fully paid up, into £5,475,000 fully paid up; £22,500 unissued "C" stock, into £56,250 ordinary stock; the remaining unissued "C" stock, authorized by the Company's Act of 1881, to be issued as 4 per cent. stock to produce the same authorized amount. The sliding-scale is corrected to a rise and fall of 1s. per cent. per half year for a penny up or down in the selling price of gas. The old 5 per cent. debenture stock is made convertible into 3 per cent. debenture stock. At any time after the total investments of the Company's employees in the Company's stock under the profit-sharing scheme exceeds £40,000, the Directors may prepare a scheme for the election of not exceeding three workmen-directors to the Board. The scheme must be submitted to a special general meeting of the proprietors, and, if adopted by them, to the Board of Trade. It must then be published in the "London Gazette," and will have effect for three years from the date of such publication The scheme may be renewed by the same procedure as before. The qualification of an employee director is to be fixed by the scheme for the time being, subject to the limitations that he must have been not less than seven years in the constant employ of the Company, and have held for twelve months, and continue to hold, not less than £250 nominal value of ordinary stock. Such a director would receive fees of not less than his ordinary day's pay, nor more than four times that amount. Provision is made for the transmission of employee's deposits by nomination.

PERSONAL.

Mr. H. DAVIES, of Runcorn, has been appointed Assistant Manager at the Darwen Corporation Gas-Works.

Mr. W. H. TROUGHTON has been appointed Secretary of the Gravesend and Milton Gas Company, of which his father is Chairman.

Mr. J. H. BREARLEY, Assistant to Mr. Robert Porter, at Elland, has been selected out of more than a hundred applicants to succeed the late Mr. J. L. Mitton at Longwood.

Mr. G. M'GUIRE, Town Clerk of York, has been appointed Town Clerk of Bradford—succeeding the late Mr. M'Gowen. Mr. M'Guire was formerly Deputy Town Clerk of Oldham.

On Thursday last, Mr. WILLIAM AIRTH, the Manager and Secretary of the Morpeth Gas Company, was installed W.M. of the D'Ogle Lodge, No. 636, Province of Northumberland.

Mr. F. GIBSON, who recently resigned his position as Engineer and Manager of the Chelmsford Gas Company, has, we are informed, been offered the position of Engineer at the Valparaiso Gas-Works.

Mr. HAROLD BAKER, Assistant to Mr. Henry Tobey at the Malton Gas-Works, has been appointed Manager of the Cockermouth Gas-Works, in succession to Mr. E. W. Smith, who, as already announced in the "JOURNAL," has obtained the Chelmsford managership.

The Water Committee of the Barnsley Town Council have selected Mr. C. HAWKSLEY to undertake the engineering work in connection with their Midhope water scheme. The appointment will come before the Council for confirmation at their meeting to-morrow.

THE DETECTION OF INFLAMMABLE GAS AND VAPOUR.

MOST readers of the "JOURNAL" are aware that Dr. Frank Clowes, F.I.C., Professor of Chemistry in the University College, Nottingham, has identified himself with the study of the above subject. The investigations he has undertaken have necessarily involved much thought and experimental work, the results of which have from time to time been recorded in our columns, or in the published proceedings of scientific societies. He has, in fact, made himself a "specialist," if the term may be allowed, in this particular subject; and his thorough capacity to deal with every phase of it was evidenced by the interesting and instructive lecture he delivered at the Society of Arts on the second day of the last meeting of The Gas Institute. In the course of the lecture, it was made known that Dr. Clowes had in the press a book dealing with the whole question; and this has now appeared.* In it the author has not only endeavoured to bring together in a collected form the hitherto scattered information, so as to render it more generally useful, but has included matter never previously published. Dr. Clowes first of all attacked the problem of detecting and accurately measuring small quantities of fire-damp in the air of coal mines; and he solved it, as may be remembered, by the introduction of a standard hydrogen flame. By a quite natural process, the new method was extended to coal gas, water gas, and other combustible gases. Mr. Boverton Redwood, who has co-operated with the author, describes the method of applying the hydrogen test to the detection of petroleum vapour in the air. Though the book deals chiefly with combustible gases, the importance of detecting the presence of the poisonous carbonic oxide has not been overlooked; and due notice is taken of the valuable work of Dr. Haldane in this connection. Dr. Clowes writes clearly; and he has arranged his matter so that the subject may be readily grasped by the reader. Those who wish to go fully into the matter will be able to do so; for, following the plan adopted by some writers on scientific questions, Dr. Clowes has added a "Bibliography" arranged alphabetically. It only remains to say the text is amply illustrated; and there is a well-executed frontispiece showing flame-caps of methane and petroleum vapour over the standard hydrogen flame.

THE PRODUCTION AND UTILIZATION OF AMMONIA.

THE remarkable development which has of late years taken place in the production of ammoniacal salts has induced a French engineer-chemist—M. Truchot—to bring together all that is known in connection with this industry, and to present it to the public in book form.† The author tells us in his preface that, apart from the treatise by M. Vincent, there was no work in existence dealing with the subject; and even in this the important industries of gas and coke manufacture and iron smelting, which are every day becoming more extensive producers of ammonia, were not included. This fact led him to undertake the preparation of a book which should describe the latest processes and appliances in this branch of industrial chemistry; and he expresses the hope that his labours may be of some service to managers of gas-works and others engaged in any of the occupations in which ammonia or its derivatives are utilized.

M. Truchot begins his book by giving the specific gravities, melting and boiling points, vapour tensions, &c., of ammonia and its salts, and then passes on to narrate the history of the latter—starting from the time of Pliny, and coming down to that of Landolt. Their physical and chemical properties are next considered, and the modes of formation of ammonia described. The author then proceeds to deal with the manufacture of ammonia from natural products—coal being one of the principal sources. The processes of Cooper, Tervet, and Bolton and Wanklyn are briefly noticed; and reference is made to the experiments of Messrs. Young and Beilby, in 1881 and 1882, in the treatment of bituminous schists. The manufacture of coke, which has been productive of a large quantity of ammonia, is next taken up. The first attempts in this direction were made by Stauf as far back as 1764, at Sarrebrück. An impulse was given to the industry by the satisfactory results attending the erection of ovens at St. Denis, by Knab, in 1858; and when they were introduced at Commentry, Carvès improved them, and they were put up at Bessèges, and some years later at Terre Noire. They were further improved in 1882 by Mr. Simon, of Manchester, who introduced the heat-recuperation principle. The advantages of this principle have been demonstrated by the labours of Otto, Hoffmann, Hüssener, Solvay, and others. With respect to the extraction of ammonia from blast-furnace gases, the author speaks in the highest terms of the process of Messrs. Alexander and M'Cosh at Gartsherrie, whose works, as mentioned in another column, have just been furnished with an important addition to their plant. The various other processes of ammonia production are touched upon, including that of Dr. Mond, who calculated that if only one-tenth of the fuel burnt annually in England—estimated at 150 million tons—were treated by it, the yield of sulphate of ammonia would reach the enormous figure of 5 million tons. The next subject dealt with is the manufacture of ammonia from nitrate of soda, nitrogenous organic matters, urine, sewage, vegetable dregs, bones, peat, &c. We then come to the working up of ammoniacal liquor, which occupies 62 pages; the various appliances employed being described and illustrated. The next chapter treats in detail the subject of the manufacture of liquid ammonia and ammoniacal salts; and in the following one the author describes the methods of analyzing them, as well as of testing crude coal gas and water for the presence of ammonia. The various applications of this product and its salts are set forth at some length; and then follow a few economic considerations. The book closes with a list of the principal French patents relating to ammonia taken out since 1878, and a useful bibliography which may be studied with profit by those interested in the industry to which it relates. Without pretence to erudition, the author has produced a book which contains a good deal of information in a compact form.

* "The Detection and Measurement of Inflammable Gas and Vapour in the Air." By Frank Clowes, D.Sc. (Lond.), F.I.C., Professor of Chemistry in the University College, Nottingham. With a chapter on the Detection and Measurement of Petroleum Vapour, by Boverton Redwood, F.R.S.E., F.I.C., Consulting Adviser to the Corporation of London under the Petroleum Acts. London: Crosby Lockwood and Son; 1896.

† "L'Ammoniaque: Ses Nouveaux Procédés de Fabrication et ses Applications." Par P. Truchot, Ingénieur-Chimiste. Paris: Bernard Tignol; 1896.

OBITUARY.

We regret to record the death of Sir GEORGE MORRISON, which took place at his residence, Greencroft Gardens, Hampstead, last Sunday morning. For the past three weeks Sir George had been suffering from an attack of meningitis, brought on by overwork; and from this he never rallied, though his strong physical frame at times gave hope to his friends. For some years the deceased was a partner in the firm of Messrs. Learoyd and Morrison, solicitors, of Huddersfield, in which town he was held in the highest estimation. While a partner in the firm, he was appointed, at the early age of 27, to the town clerkship of Leeds. This position he held from 1878 to 1892; and during that period his profession elected him President of the Leeds Incorporated Law Society. In 1885, he had conferred upon him the honour of knighthood, in recognition of the services he had rendered to the country in municipal and kindred legislation, and in commemoration of the jubilee of municipal corporations, in the celebration of which he took a leading part. In 1893, he was called to the Bar, and joined the Inner Temple. His practice was chiefly at the Parliamentary Bar, and in connection with local government inquiries; his extensive knowledge of municipal law having immediately gained for him a leading position in this branch of legal work. In the past session, Sir George was one of the Counsel for Barnsley in the prolonged inquiry in regard to the Don watershed; and he was associated with Mr. Shiress Will in protecting the interests of a petitioner affected by the proposals contained in the Bill of the New River Company. Deceased was only in his 46th year.

Additional Capital for the West Middlesex Water Company.—In response to a notification by the Directors of the West Middlesex Water Company of their intention to issue £100,000 of 3 per cent. debenture stock, redeemable at par after the expiration of 25 years, the investing public showed their appreciation of the value of the stock by tendering for it nearly four times over. The highest tender accepted was at £12 10s. per cent. premium; the lowest, at £3 1s. 6d. per cent.—the average being at £3 16s. 1d. per cent.

The "Holophane" System of Illumination.—In the "JOURNAL" early last year, we described the above-named system, which, as our readers will doubtless remember, is the outcome of studies and experiments conducted by M. André Blondel, the well-known Consulting Engineer for the French lighthouse system, and M. Psaroudaki, of the Athens University. These two gentlemen have succeeded in producing a globe upon strictly scientific principles. It has its interior surface covered with vertical ribbings which break up and diffuse the light; while on the exterior surface the ribbings are horizontal, so that the rays are sent in those directions where the most light is required. The globe, in fact, is wholly luminous (hence the name "Holophane"); and the inventors claim for it the very important property of giving greater illumination than is afforded by the bare light which it encloses—thus differing in a very marked degree from ordinary globes. Experiments made by Professor Vivian B. Lewes show this increase to be 12·3 per cent. with the tulip-shaped, and 13·1 per cent. with the cone-shaped globe, as compared with losses ranging from 11 to 51 per cent. when ordinary globes are employed. A Welsbach burner of 50-candle power covered with a "Holophane" globe is stated to give 12 per cent. more light than with a chimney only. The globes are applicable to all kinds of light—arc and incandescent electric, incandescent gas, and oil. The Company formed to work the system have opened show-rooms and offices at Nos. 91, 93, and 95, Queen Victoria Street, E.C., where various patterns of globes may be seen.

NOTES.

The Inoculation of Soil for Nitrogen.

An invention of a very remarkable character, which may be truly described as a "pioneer" invention, inasmuch as its object is totally different from anything that was ever before brought into the Patent Office of any country, has just been patented by Dr. F. Nobbe and Dr. L. Hiltner, of Tharand, Germany. It is for a preparation by means of which nitrogen-forming bacteria can be practically added to land intended for the growth of leguminous crops. The late Professor Hellriegel discovered that certain leguminous crops are able to fix the free nitrogen of the atmosphere by means of nodules upon their roots which were found to contain bacteria; and this discovery was corroborated by Wilforth and Beyerwick, who succeeded in isolating these bacteria. Dr. Nobbe, following upon these indications, has found that the bacteria in question can be independently cultivated; and that, when introduced into soil prepared for the growth of suitable crops, they render the plants capable of assimilating free nitrogen. Thus, a soil destitute of any assimilable form of nitrogen, when inoculated with these bacteria, will produce a rich yield from the growth of a leguminous crop, whereas the plants without such inoculation would have starved. According to the patent specification, pure colonies of the active bacteria for the leguminosæ are obtained in agar-gelatine, with suitable additions according to the species to be grown. Or the bacteria can be prepared in fluid cultures. An emulsion of the contents of a culture-tube in water is poured over the seeds; and these are then mixed with sand or earth, so as to prepare for drilling into the ground in the usual way. Or a small quantity of sand or earth may be moistened with the bacteria-charged emulsion, air-dried, and then worked into the soil. The use of artificial sources of nitrogen, such as sulphate of ammonia or nitrate of soda, becomes the crudest and most wasteful method of fertilizing a soil in comparison with this new process. The German coal-tar colour firm of Meister and Co., of Höchst-am-Main, will deliver a preparation of this kind, under the name of "nitragin," suited to seventeen different varieties of leguminous field crops. It is stated that about half an acre of arable land can be thus inoculated for half-a-crown. What is to become of the trade in artificial manures, at this rate?

Cotton Belt Conveyors.

An instructive and highly practical paper on belt conveyors for manufacturing uses was read by Mr. Thomas Robins, jun., before the last meeting of the American Institute of Mining Engineers. The author stated that about six years ago he saw india-rubber belts used on a large scale for conveying iron ores in a concentrating works; and he observed that, while they treated an enormous amount of material with a small expenditure of power, they wore out very rapidly, especially along the middle line. It was concluded from these observations that the function of the cotton duck foundation should be solely to provide tensile strength, and that the protection against wear should be given by some abrasion-resisting cover which should be heavier on the carrying side, and also extra thick in the middle. By dint of prolonged experiments, Mr. Robins claims to have found the proper covering material to use for this purpose. With regard to the best method of supporting conveyor belts, Mr. Robins pronounces in favour of three pulleys—one carrying the belly of the belt, while the others are placed one on either side of it, at an angle of 45°, to take the outer edges and tilt them up so as to form a trough-like cross section. The return belt can run flat on a single plane pulley. The troughing-pulleys should be from 6 to 8 feet apart, according to the weight of the load, with plane pulleys at double the distance for the return. One of the most wonderful things in connection with this subject is the small amount of power required to convey an enormous weight of material. It is, however, impossible to state a general rule for calculating this power. Belts run from 20 to 36 inches wide, and work well at a speed of 450 feet per minute on the level, or half as fast again if at an angle. Mr. Robins asserts that such belts cost less to instal than any metal conveyor, while their maintenance does not cost so much.

Cleaning the Sides of Open Reservoirs.

A recent number of the "Engineer" contained an illustrated description of an appliance devised by Mr. J. F. Rodda, the Superintendent of the Eastbourne Water-Works, for cleaning the sides of open reservoirs. The thick growth found there often requires the use of wire brushes, and even scrapers, for its removal. This is a tedious process, and moreover requires scaffolding. Mr. Rodda's arrangement is simply a revolving broom, which it is claimed does the work efficiently at half the usual cost. The wood frame is fixed on low wheels to facilitate its being worked easily around the coping of the reservoir wall by means of a pair of bevel-wheels. The revolving broom is hung in differential pulley-block chains carried over the usual sprocket wheels, and running up and down in light angle-iron guides hung on the wood frame, when used in cleaning the vertical sides of reservoirs. If the sides are sloping, the guides are not necessary. A flexible hose is attached to the wood frame, joined to a sprinkler which conveys a stream of water down the side of the wall being scrubbed.

TECHNICAL RECORD.

EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.

The Half-Yearly Meeting at East Retford.

We complete to-day our report of the proceedings at the above meeting by giving the paper read by Mr. W. J. Jenkins, Assoc.M.Inst.C.E., of Retford, with the discussion thereon.

OBSERVATIONS ON THE CONSTRUCTION AND WORKING OF REGENERATOR SETTINGS.

To one who has an observant disposition and takes an interest in details, few things in gas-works are more striking than the great diversity in the ways of working regenerator settings. Some difference must, of course, arise in every place owing to variation in the size of chimneys and in the prevailing direction and force of the wind, which affect the draught. But, even allowing the widest limits for such influences, the divergencies in the area of opening of the primary and secondary air supply are still far greater than would be expected. In one gas-works, all the secondary air required for a setting of nines will have to pass through two openings 4½ in. by 1½ in.; while in another, the opening will not be less than 6 in. by 4 in.

What is the reason for this state of affairs? It is very probable that, by frequent trial and error, the particular opening arrived at in each works is the one which gives the best results as regards the production of gas, although the consumption of coke in the producers may or may not be the lowest possible. It is by no means an easy thing for an experienced stranger to make a complete re-arrangement of dampers and air-slides in one gas-works, to suit experience gained with other settings in another works, or to fit any theory. Yet there should be little more difficulty in doing this than there is in setting the valves of a steam-engine—providing the construction of the furnace and passages can be referred to some standard proved by frequent practice to be in accordance with a reasonable theory. To point out divergencies, from such a reasonable theory, found in many types of construction, and to evoke discussion on the opinions advanced, is the object of this paper.

The number of pounds of coke to be consumed per hour in the producer is the starting-point in the design of a setting; and when this quantity is decided, the amount of primary air is also settled by a very simple calculation. If we knew the draught in the ash-pit, we should be able to proportion the area for the primary air without very much trouble; but in most instances such a calculation would be quite useless, because we should not know what leakage of air was taking place owing to badly-built brickwork and leaky doors. You might, in many cases, close all the air-inlets designed for the purpose, and yet have more producer gas generated by leakage than is needed to work the setting.

Tight, well-fitted doors are, therefore, almost as necessary at the ash-pit as on the retort mouthpieces. The area of the grate is usually such that 5 to 6 lbs. of coke are gasified per hour per square foot, where producers are on both sides of the stack; but 10 to 11 lbs. per square foot can be gasified with very little draught, and consequently one producer per through setting answers very well. Indeed, where economy of coke is the first object aimed at, the single producer has the advantage of being less likely to waste fuel, because it is worked nearer its limiting capacity. As regards the use of steam below the grates, it is a fact that producers for steel melting and other metallurgical purposes are now almost invariably supplied with steam-jet blowers, because of the more perfect control attained and the better gas produced; and certainly the steam must be much better distributed among the air in the forced-draught system than in any other.

The question as to what is the proper temperature for a producer, is best answered by saying that the higher the temperature, up to 2000° Fahr., the better the gas produced; but the temperature need not be so high as to damage the brickwork, for Ledebur has shown that the reducing action takes place most effectively between 1600° and 2000° Fahr. By passing dry air through coke at 660° Fahr., it was found that the resulting gas contained 85·2 parts of carbonic acid to 14·8 parts of carbonic oxide. At 970° Fahr., the result was 79·6 parts of carbonic acid and 20·4 parts of carbonic oxide; while at 2000° Fahr., the proportions were 2·2 parts of carbonic acid and 97·8 parts of carbonic oxide. Akerman confirmed these results, by passing carbonic acid gas through charcoal kept at a given temperature. At 606° Fahr., no carbonic oxide was found; at 740° Fahr. there was 0·4 per cent. of carbonic oxide; and at 1684° Fahr. there was 13 per cent.

The next points of construction to be attended to are the size and position of the outlets or nostrils in the producer arch. Generally, the nostrils are too large; and frequently they are in the wrong position. The former fault arises mostly from a fear of choking up in working; but with proper fire-resisting material, there need be no great change in the size from season to season, and a damper-brick can be placed in such a position as to regulate the opening, while being moveable from outside. If the setting is worked under a sharp draught, there is always a chance of severe cutting taking place with small nostrils. But in these days it should scarcely be necessary to say that it is almost impossible to get uniform heat all over the

setting, unless there is a slight pressure outwards under the arch; and when the dampers are arranged to give this, there will be no fear of cutting action if the nostrils are large enough to take all the gas required, and yet not so large that one or two nostrils more favourably situated as regards draught get more than their share of gas.

With dampers arranged as described, there will seldom be more than the slightest draught at the crown of the producer arch; and the velocity of outflow of the gas will not exceed 12 feet per second. For a setting of eights, carbonizing 3½ cwt. per mouthpiece four times per 24 hours, and consuming 13 lbs. of coke per 100 lbs. of coal carbonized, the area of the nostrils would work out at a total of 120 square inches, or (say) twelve nostrils 5 in. by 2 in., six on each side. The struggle for a combustion chamber has misled many gas engineers, and ruined their settings.

"Combustion chamber," in this sense, means a low-arched chamber (with side outlets), in which combustion is supposed to take place better than in any other way. Into these chambers the gas is frequently delivered through vertical nostrils in the crown of the arch. Cases of settings of nines are plentiful where the centre bottom retort has melted down in a few weeks, while none of the other retorts ever reached a moderately good heat. In many instances the gas has been delivered into a so-called combustion chamber immediately under the centre retort, and through the centre of the producer arch. In such cases intense combustion takes place in a very confined space; and high local heat, with very little diffusion, is the result.

When the bottom middle retort has been removed, and the setting converted to eights, the setting has worked satisfactorily, although no change was made in the position of the nostrils. But if the nostrils had been in the right place, there would have been no difficulty with the nines. The best combustion chamber is the highest space to be found inside the setting; and that in a setting of nine or eight is the space between the middle and side retorts. Consequently there should be two rows of nostrils, one on each side of the arch, in such positions that the flame will ascend vertically in the two free spaces between the retorts. For settings of seven, no better arrangement need be desired than that having three retorts in the top tier, and two for the other two, with vertical nostrils in the arch. There is sufficient height for the flame to develop in this case; and a peep inside a setting of this sort as arranged by Mr. Carpenter, of the Vauxhall Gas-Works, is a liberal education in gaseous combustion. How important it is to have height for the flame to develop in can best be appreciated by remembering that in a free space the flames would be yards high. No gas engineer would expect to get a good heating effect by placing a body close down on the top of an ordinary gas-jet.

As regards the secondary air supply, it may be mentioned that the majority of the regenerator passages in use in gas-works in this country follow one of two types—viz., (1) the Siemens type, where the air passes upwards through one or two passages on each side of the producer in a continuous zig-zag direction—the passages being arranged parallel with the centre lines of the retorts; and (2) the Klönne type, where the air passes upwards almost vertically, but is baffled about by small tiles in its course.

Now in the Siemens type of regenerator, the whole of the air is delivered into the chamber which feeds the air-nostrils, either at one end or the other; and if combustion is to take place uniformly throughout the length of the retort, the air must be delivered uniformly also, and the united areas of the air-nostrils must not greatly exceed the united areas of the air-passages. But usually there is no kind of proportion between them; the air-nostrils often being five or six times the area of the passages. In all such cases, the whole of the air gets into the setting through the first two or three nostrils, and severe local heating takes place; while half the length of the retorts becomes but very little hotter than the gas from the producer.

In the Klönne type of regenerator, the matter arranges itself somewhat differently, because there are two ways of regulating the air supply. First, the distributing chamber under the regenerator is made with outlets increasing in size from the front to the back of the setting; so that some air will reach the back in any case, and then a further distribution can be made by regulating the area of the air-nostrils.

Now it is a handy rule to bear in mind that the volume of air required to burn a mixture of producer gas is the same as the volume of the producer gas, when allowances for difference in temperature and surplus of air are made. Consequently the air-nostrils should also have a total area of 120 square inches or twelve nostrils (six on each side) 5 in. by 2 in., or the equivalent. To supply all these nostrils, it will probably be sufficient, in the Siemens type of regenerator, to allow 120 square inches of area of passage, because in calculating the area of the gas-nostrils a co-efficient of contraction has been used to allow for the well-known effect of friction and sharp edges in reducing the delivery of orifices.

We very seldom find any such area allowed, however; and then the draught must be greater all over the setting to get sufficient air in to burn the gases, with the result that the heat is localized at a few nostrils, which rapidly melt away, and unequal heating occurs. Except just at the nostril, the larger the passage can be got the better; and it is also advisable to make the reduction by means of a tile which can easily be removed for cleaning purposes when the setting is out of action, or when the retorts are being renewed. After all care has been taken in the design, we cannot prevent odd pieces of brick or fire-clay from getting into the nostrils when the retorts are being reset; and provision should be made to meet such exceptional difficulties. Some engineers prefer a few very large nostrils, both for gas and air, in place of a greater number of smaller ones. In either case there is not much difficulty in adjusting the areas to suit the circumstances.

The amount of draught to each setting is of vital importance in the working; and the regulation is by no means easy when many settings deliver into one main flue, for if the two dampers of each setting are fixed so as to give the desired draught at a given point in the setting when the atmosphere is in one condition, the whole scheme may be upset a dozen times in a day by changes in the direction of the wind. This can only be corrected by moving the chimney damper; and it is worth considering whether the automatic draught-regulators now frequently used for boilers would not find a useful place in gas-works. So essential to the efficient working of a setting is good control of the draught, that Mr. Klönne shows in some of his advertisements a short chimney to each half of a single 10-feet setting, with a cap damper on the top of each.

Without a slight pressure in the top of a setting, it is very difficult to get really even heats. Yet too much pressure has the effect of reducing the heats—not by reducing the gas, but by checking the secondary air. Plenty of gas will usually get into the setting. Ample secondary air inlets and passages are a necessity for economical work.

In spite of the utmost care in design, bad results may come from careless construction. It is a most wearisome task to keep bricklayers from building settings as they would cottages. They look upon thin joints and fire-clay spread over the whole surface of the brick as wilful waste and wanton ignorance of the true art of setting bricks; and though they may do what you tell them while you are near, as soon as you are away the clay is only put round the four edges of the brick, and the centre is left hollow. In such cases leakage must ensue; and leakages are fatal to success. Too many sight-holes into the regenerative passages are detrimental and useless; removable bricks built in are better.

Beware, also, how the connection is made between the outside of the chimney-flue and the division walls of the Siemens type of regenerator. This is nearly always defective; because the division walls expand and draw away from the cross wall of the main flue, leaving a gap through which the air can get to the chimney at once without going into the setting at all. The best way is to tie a layer of casing bricks into the division walls, so that if these draw away from the flue the casing bricks will draw with them, and still keep the ends of the passages intact. The whole success of regenerator settings depends upon such small points as the foregoing; and when these are attended to, there is no difficulty in making a large saving even in the smallest works. Indeed, there is little doubt that the proportionate saving with settings of threes is greater than with nines, because where threes are in use coke sells generally at a high price owing to the short supply.

The majority of the early difficulties with the inclined retort settings arose from imperfect heating of the retorts; and much undeserved discredit came upon the system itself owing to imperfect carbonization. When the charges are not well burnt off, the trouble in getting the coke out of the retort is great; and the labour is exhausting, and very disagreeable. But when the coke is well carbonized, it will fall out of the retort without labour at all. In the earlier settings, holes were burnt into the retorts near the top end, while the bottom end could not be got red hot; and there are very few inclined settings now working which have not been reconstructed since they were originally put up. The reconstruction has generally taken the form of a better proportioning of the nostrils to the volume of gas and air they have to supply.

The natural tendency of the hot gas is to go out into the setting at the highest point; and if the nostrils there are large enough, all the gas will pass out at one end. This is what formerly took place. The arrangement adopted by Mr. Graham consists of a small arched chamber, built along the top of the producer arch, and at the same slope. The producer arch has a few large nostrils delivering into this small chamber; while the latter has a large number of rather small nostrils distributed throughout its length. The operation is similar to that of a common boiling-ring where perhaps a ¾-inch pipe is used to supply a dozen $\frac{1}{16}$-inch gas-jets. The effectiveness of such a proportion is complete; but it would be far otherwise if the ¾-inch pipe were expected to supply half-a-dozen ⅜-inch jets. This is the existing state of many horizontal settings, and was the condition of many inclined ones, only their construction gives room for the action of unequal heads of gases, and emphasizes all defects until they become intolerable.

Another modification which gives excellent results consists in the division of the setting into two halves by means of a 9-inch transverse wall carried up to the arch. The gas and secondary air supplies to each half are quite distinct, and can be regulated by separate dampers. Complete control is thus attained over the heating of the retorts, and the labour is reduced to its lowest limits.

In conclusion, permit me to express my regret that the time at my disposal since Mr. Fenwick asked me to read a paper has

been too short for the preparation of drawings, which would have illustrated the matter better than pages of writing; and the same reason must be my excuse for the numerous omissions which you will all be able to detect.

Discussion.

Mr. W. R. CHESTER (Nottingham), invited by the President, said the Association were to be congratulated on having got Mr. Jenkins to read this paper on regenerative firing. But though there were many points in it which bristled with controversial matter, one could not help feeling that, in bringing forward a paper of this description before an Association of Gas Managers, it was to some extent equivalent to bringing coals to Newcastle; for many members of this Association had had experience of regenerative furnaces extending over probably the past twenty years. Though perhaps it had the appearance of bringing coal to Newcastle, it had one very satisfactory feature about it—that it enabled them to see themselves as others saw them. Mr. Jenkins, in preparing his paper, approached the subject from the point of view of the outsider, and brought his scientific training to bear on what he considered were some of the defects in connection with the construction of regenerator furnaces. He pointed out that it ought to be possible, in the case of regenerative furnaces, to control the heating power as easily as it was possible to control the power of the steam-engine by regulating its valves; but he seemed to forget that the two things were entirely different. In the case of the steam-engine, the speed was regulated by the turning of a valve with a power that was under compression; whereas, in the case of regenerative furnaces, the controlling power was one of vacuum—it was a totally distinct thing from the pressure-control of the steam-engine. Where they got a vacuum, which was a natural force as against an artificial one under artificial control, they could regulate the dampers to a certain point according to the standard they might set in their own minds; but that would vary with every varying condition that took place at different gas-works. Every chimney, every foot of the chimney, every square inch of the area of the chimney, affected the point at which a particular damper opening had to be arranged. The only true way in which they could regulate the combustion of the regenerative furnace—that was to say, to a point of perfection—was to analyze the gases, and regulate the dampers and inlets both of the primary and secondary air by the correct proportions of the products of combustion. Unless the regulation was based upon the percentages of the products of combustion, there could be no standard size fixed for the inlets of the primary or secondary air, the nostrils, or any other portion of the setting. Mr. Jenkins pointed to the possibility of one producer working with greater satisfaction than two producers; but then, again, that depended upon conditions which depended upon the quality of the coke used for firing purposes, and upon the percentage of ash the coke contained. If they had a fuel containing somewhere about 5 per cent. of ash, they might certainly venture to use one producer to a setting, and heat it with perfect success; but if they had another fuel containing 20 per cent. of ash, it would be impossible to get sufficient area on one producer to heat the setting to satisfaction. Therefore the condition of the fuel must be taken into consideration in determining whether they should apply one or two producers to a setting. It was a well-known fact that, at different degrees of temperature, they got different percentages of carbonic oxide. But they might carry the temperature of the producer up to 2000°, at which they would perhaps get the highest percentage of carbonic oxide; but there was no necessity to carry the temperature to anything like that point. They could convert about 10 per cent. of their fuel into gas, and not get carbonic oxide, by working at a lower temperature than that; and the admission of steam into the producers also tended to lower the temperature to a point which would enable them to continue for a great many years. He thought that perhaps it would not be an exaggeration to say twenty years might be arranged for for a single producer, without doing one single atom of repairs to it, by means of a judicious admixture of steam with the fuel. Mr. Jenkins referred to a very successful setting of Mr. C. C. Carpenter, of Vauxhall—a setting he (Mr. Chester) believed was of sixes, which was admirably adapted to the purpose, giving a long combustion chamber, whereby the combustion took place without being severe in its action on the retorts. This was admirable so far as it went for a setting of six retorts; but a setting of six did not work so economically as seven, and the seven did not work so economically as eight. But when they reached eight, they got somewhere about the practicable limit. If they went to nine, they found that the arrangement of the retorts was such that it brought the combustion very severely round the bottom retort; and this tended to its rapid destruction. They could not go upwards, because, except in cases where machinery was employed, they could not extend the retorts beyond three rows placed one above the other. He thought the paper showed very great care in its preparation, and thoughtful observation on the part of the author in watching the various effects of an apparatus that, to some extent, came outside the ordinary range and vision of the engineer.

Mr. W. D. CHILD (Romford) said he should like to mention his appreciation of one remark of Mr. Jenkins, in which he suggested that an automatic damper, similar to what was used for controlling the draught to the furnace of a steam-boiler, should be applied to the regenerative furnace. He did not catch what would be the motive force of the automatic damper. If any such appliance could be arranged, it would be the one thing that was desirable. He thought they could, by calculation, and knowing the amount of fuel that was required to be expended, arrange very nearly what the primary and secondary air openings should be under certain conditions. But, as Mr. Jenkins pointed out, the conditions of the draught were constantly varying from the effect of wind on the chimney; and they then fell back upon the one controlling valve of the damper, with which, as ordinarily constructed, it was difficult to exercise a very delicate control on the draught. If some more effectual means—more especially an automatic arrangement—could be designed, it would be of the very best possible use for regenerative working.

Mr. J. BARTON (Peterborough) said he thought, if they were to compare things, they would not find two regenerative settings working alike. From the little experience he had had, he found there was a great difference in them. Mr. Jenkins recommended doors to the producer furnaces. He knew four furnaces to be working four beds without any doors at all. But there was an arrangement in front of the opening that caused the air to go immediately underneath the fire-bars, and through the body of the fire. He believed most of the settings had primary air chambers; and these came out of nostrils underneath the bars. The air would naturally take the easiest course it could; and, from experience and observations he had made, he found with the doors, and the primary air going in that direction, instead of it passing up through the body of the fire, it went to the front of the fire. Consequently, above the arch over the doorway, there had been quite an arch of clinker formed. After this was observed, an alteration was made. The producer doors were taken away, and an arrangement for forcing the air underneath the fire was applied; and the regulation of the whole thing had been worked by the damper itself, with very economical results as regarded the consumption of fuel, and the regularity of the heats. This showed that what suited one place did not suit another; and he did not think that any hard-and-fast line could be drawn in the regulation of these regenerator settings. The secondary air had, of course, been adjusted. There was another point with respect to the nostrils mentioned in the paper. In one case, he thought the author said the nostrils were too large. He (Mr. Barton) did not know whether Mr. Jenkins meant the nostrils from the furnace or the combustion chamber. Then, lower down in the paper he remarked that there would be no fear of cutting action if the nostrils were large enough to take all the gas required, and yet not so large that one or two nostrils more favourably situated as regarded draught got more than their share of gas. He took it these would be the nostrils from the furnace. He preferred the nostrils large, because he believed the more area they had, the better would be the regulation and constancy of the heat.

Mr. H. WIMHURST (Sleaford) said the author had thrown out some suggestions in the paper which would be useful to all working with regenerative furnaces. Regarding Mr. Barton's remark about an arch of clinker forming immediately behind the arch of the furnace, he believed that, if he applied proper drip-plates for a water supply to go down under his furnace bars, he would not have found any clinker there, or even that the air would have passed through in the manner described; but it would naturally have come in under the furnace bars. In his case, they had been working Winstanley's furnaces with great success for twelve months; and with drip-plates, they never found any clinker there at all. He believed Mr. Winstanley himself did not clinker for months together; and this called to his (the speaker's) mind the remark made by Mr. Chester that, using different classes of coal, with different quantities of ash, they would get different results. He (Mr. Wimhurst) did not know what class of coal Mr. Winstanley used; but he informed him that he had not clinkered for fifteen months together. He could not say it was so at Sleaford; they had to clinker about twice a week. A few days since, they changed their coal contractors; and immediately they had fresh coal, it upset their regulation of the dampers and air supply altogether. Their heats went back; and at last he came to the conclusion that it was the different quality of fuel the new coal supply furnished them with.

Mr. BARTON said he might point out that the furnace he had referred to was supplied with drip-plates, and everything that was proper with regenerative furnaces. It was discovered that the air found its way in the front of the furnace simply because the coke was burnt to ash quicker at that particular place; and the clinker was formed some distance in the furnace. Since it was altered, and the air driven under the bars, the clinker had disappeared.

The PRESIDENT said he was working regenerative furnaces; but he found, when he had nostril holes, that they cut away his top retorts very much. Mr. Barton had remarked that he preferred large nostril holes; but he (the President) preferred none at all. He took the nostrils out altogether, and made it an open setting completely through. He had seen from different papers that the writers argued that the combustion chambers should be as large as they could possibly be made. He could not, however, understand why they should put two arches in the centre of the setting, and at the same time say the combustion

chamber should be as large as it could be made. However, he took the hint, and threw the centre arch into the combustion chamber. From that time, his heats had been as regular as possible. The consumption of coke had also decreased; but he could not give the precise figures.

Mr. JENKINS, in reply, thanked the speakers for the kind way in which they had received his paper, which only pointed out a few of the little difficulties he had met with in the construction of regenerative settings under contract. As regarded the damper regulation, he knew of one works where this was done in what might be called a scientific way—by putting a 1½-inch pipe into the bottom outlet from the regenerator immediately before the damper to the chimney, and, by having a King's gauge outside, setting the draught to the damper at a certain figure—to ⅛ or ¼ inch—depending upon the position of the setting in relation to the chimney. He had not, however, seen this done generally. With regard to the producers, he was quite at one with Mr. Chester that two were better than one, providing the amount of coke put in them was something like the proportion of what it should be. But it frequently happened, in his experience, that the producer was actually empty of coke for the greater part of its time; and he might say that the more economically a setting was working, the worse was the producer acting. The drawing of a certain retort was generally settled upon for the producer. When that happened, if the producer had used the coke out to a certain depth in the course of three hours, it ran as an open fire for the remainder of the time; and when economy of fuel had to be considered principally, a single producer seemed to him to stand a better chance. Without steam it was almost impossible to keep the producer sufficiently cool to enable it to last a long time. He had seen a good many different systems of water-drips and so on; but still the steam should have the effect of preventing the detrimental heating of the bars that went on in many settings. The only system he had seen in England of blowing steam in the producer by means of a steam-jet was one at St. Helens in settings of sevens on Mr. Carpenter's principle. The blowing of air in under the bars seemed to have had a considerable effect and economy there; but that was a large producer supplying, he believed, three settings. Regarding Mr. Child's question about the damper regulator, he did not know the maker just then. It was worked by the suction, something like an exhauster governor; and they were getting widely used in Lancashire at the present time. The filling of the producer had an important effect on the way it was going to work. If they could fill it always to the same level, there would be no occasion for doors; but if they could not arrange for that being done, he thought the door better than the open fire. He was quite prepared to say that one or two nostrils, in proportion to the amount of fuel consumed, were better than a good many small ones. But, in his opinion, it was wrong to have two or three large nostrils, when one of them was sufficient to take all the gas that could be produced in the producer. As to the air supply, it would be in the knowledge of every member present that it was a common thing to have Siemens's zig-zag flues—say, 10 in. by 4½ in. All the air had to pass along these flues; and, when the air was admitted into the setting, they would find nostrils wanting altogether, and simply an open chamber. The consequence was the air went up in the setting straight along to the end. If they had a Siemens's setting, they should have some kind of proportion in the size of the air-nostrils, to let the air go the whole length of the setting. In reference to Mr. Wimhurst's remarks about the coal supply, that, of course, raised a considerable number of questions between gas engineers in the North and Lancashire district and in the London district. They often heard of much better results being obtained in regard to clinkering where Newcastle or Durham coal was used than in other districts. It frequently happened that in the South of England they could run for three days without clinkering; whereas in Lancashire, they would have to clinker every 24 hours at least. He was pleased to hear the President's experience with the open chamber without an arch. As to Mr. Graham's experience, he had three or four large nostrils out of the producer delivering into a small chamber with twenty or thirty small nostrils, not more than 2 inches in diameter. The object of this was to get the gas down to the bottom end.

The Adulteration of White Lead.—The strength and quality of white lead is an important matter to those concerned with the fittings of gas and water services; and it is therefore of more than passing interest to learn that the London Chamber of Commerce have taken a decisive step in order to put an end, if possible, to the wholesale adulteration which goes on in connection with this article. According to a circular-letter just issued to the various Chambers of Commerce, a special guarantee fund of £5000 has been raised for the purpose of undertaking actions against offenders under the Merchandise Marks Acts, in order to prevent further injury to the white lead trade in consequence of adulterated or reduced white lead having been sold and invoiced or guaranteed as "genuine." The letter further states that it has been decided by the leading corroders of white lead to discontinue the use of the term "best" as a trade description of admixtures of white lead, and from the 1st of October to mark and invoice admixtures with the word "reduced."

SOCIÉTÉ TECHNIQUE DU GAZ EN FRANCE.

Notes on Papers at the Annual Congress.

A recent number of the "Journal des Usines à Gaz" contained notes on the communications which came before the members of the Société Technique du Gaz en France, at their annual meeting in June at Clermont-Ferrand. The papers were rather numerous, as compared with those presented to our principal technical societies; but they were shorter. Some of them, owing to delay on the part of the authors, could not be printed and distributed in advance.

A paper describing the system of condensation at the Rennes Gas-Works was presented by M. Ymonet. This section of the plant, especially the vertical condensers, has been re-arranged with the view of avoiding great variations of temperature and excessive cooling. In planning the necessary changes, the author endeavoured to carry out the principle that condensation should be progressive and methodical, and that the gas should not be subjected to any sudden cooling. As the condensable vapours which pass out of the hydraulic main are unlike in composition, and have different boiling-points, they necessarily do not condense at the same time and spot. It therefore seemed to the author reasonable to place all the condensing plant in one building, and keep it at the same temperature; and instead of running his two vertical condensers simultaneously, he worked them consecutively—thereby ensuring gradual condensation in the passage of the gas through the various appliances. The results obtained showed that this system possesses many advantages over cold and abrupt condensation; a very important one being the avoidance of deposits of naphthalene, no trace of which has been found in the mains, either on the works or in the town. It appears to be tolerably certain that the aqueous vapour should be condensed before the light tarry vapours—at about the same time, in fact, as the heavy tars. When condensation was carried on in the open air, water was found in the syphon boxes of the plant, and tar as far forward as the purifiers. Since it has been carried on under cover, by the progressive system, no water has been met with beyond the vertical condensers, while only very slight quantities have been found in the last syphons of these appliances. At the Pelouze and Audouin condenser, there is scarcely a trace. The foregoing is an outline of the process adopted. The author hopes to be able, at the next meeting, to give the results of the experiments he proposes to carry on during the coming winter.

The subject of the detection of leaks of gas was dealt with by M. Rouget and M. Sar. The former described an appliance consisting of a figured dial, over which moves a needle in connection with a diaphragm working after the manner of an aneroid pressure-gauge. This diaphragm covers one end of a cylinder, the other extremity of which is closed by a special porous composition, through which gas can pass by endosmosis. The interior of the appliance is put in communication with the atmosphere by means of a tap. With this open, the needle would be at zero. If the tap is closed, and the indicator is carried into an atmosphere charged with gas, the needle is seen to move to the left, and take a fixed position, the number nearest which will indicate the percentage of the mixture of air and gas. By taking the instrument from place to place, and probing the ground, the movements of the needle will show whether or not the leak has been localized. The appliance shown by M. Sar is based upon the well-known principle that platinum sponge absorbs gases while heating itself. The rise in temperature, without being strictly proportionate to the quantity of hydrogen or of gaseous hydrocarbons contained in the subterranean atmosphere, is nevertheless capable of furnishing some indication of the extent of an escape. The appliance consists of a box, wherein a special thermometer registers the heating of the platinum sponge; and this may be compared with a second thermometer left in contact with the outer air. A pump arranged to aspirate the air from the hole made by the probe, and conduct it to the instrument, facilitates the operation.

Electric ignition of incandescent gas-burners, whether used for private or public purposes, was a subject taken up by M. Galy, who described the system adopted by the Centre and South of France Gas Company. The spark is produced by an induction coil actuated by a dry battery; the whole being disposed in a box carried by the lamplighter. The torch (a bamboo rod) is provided with two wires, by which the induction coil in the box is brought into connection with the electric apparatus, contained in a porcelain bell attached to the bottom of the lamp. When the burner is to be lighted, the end of the torch is inserted in the bell, and the current turned on by means of a press-button. The principle has been applied to the simultaneous lighting of burners on chandeliers; a single battery of four or five elements and an induction coil being sufficient for the service. The author gave the following figures as the cost of maintaining 32 burners which had been in use for 120,324 hours: Replacement of 115 mantles and 50 chimneys, 340 frs.; upkeep of the lighting-boxes, 18 frs. 20 c.; renovation of worn parts, 22 frs.; labour, 120 frs.—total, 500 frs. 20 c.—under 0·5 c. per hour.

M. Bigeard gave an account of some trials of incandescent gas-burners for public lighting at Angers, extending from July 1, 1895, to May 1, 1896. From an economical point of view, they

were not very encouraging, though there was undoubtedly an improvement in the lighting. The trials are being continued with an improved lantern which the author described; and the results will be laid before the members at the next meeting.

M. Visinet offered some observations as to the use of chloride of calcium in gas-meters to prevent freezing. It appears therefrom that he is not particularly impressed with its value. Some of his meters were put into such bad condition that they required repair after two or three years' use. It was found that several of them contained considerable calcareous deposits; that others had coatings of dust and rust; that the wheels, and in one instance a drum, bore traces of the metal having been attacked; while in several the cases were perforated. Notwithstanding this somewhat unsatisfactory experience, a considerable number of gas managers who had tried chloride of calcium spoke in its favour; but they assured themselves that its solution was perfectly neutral, and even rather basic, and that the gas had been well purified and washed, so as to reduce to a minimum the carbonic acid and ammonia. It is not exactly known what takes place when a solution of chloride of calcium is in contact with these two impurities; but it is not improbable that there may be formed carbonate of lime, or hydrochlorate of ammonia or its element. Chemical analysis of the deposits found in meters returned for repair should furnish some definite information in this regard.

A paper dealing with purification was contributed by M. Jouanne. The author proposes to put the purifying material into a moveable case which is placed in the purifier; the sides dipping into a hydraulic seal formed upon the periphery of the bottom of the box. It is claimed that by this system the operation of purifying will be simplified, and the revivification of the material will be effected with considerable economy of time and labour.

M. Chevalet, in two papers, dealt fully with the subject of ammoniacal liquor. Crude liquor contains sulphurous combinations which it is sometimes advantageous to take out. For this purpose, the author proposes to use his scrubber fitted with trays, but filling the latter with iron turnings oxidized in damp air instead of the usual wood shavings. The ammoniacal liquor is passed through slowly; the scrubber being left open top and bottom. The oxide of iron takes hold of the sulphur in the liquor, and becomes transformed into sulphide; being subsequently brought back by the current of air into the condition of oxide, and serving for an indefinite time. If loss of ammonia is feared by the aëration of the column, the air current is passed into a smaller scrubber, the trays of which are filled with wood shavings slightly moist. The gases contained in ammoniacal liquor may be easily liberated and collected by means of a very simple appliance, the operation of which was explained by the author. He appears to think that they consist of carbonic acid, sulphuric acid, and a gaseous residue, which would be nitrogen, not being inflammable. This point requires confirmation; and the details furnished were insufficient to lead gas managers to purify their gas by the aid of ammoniacal liquor, the latter destined to absorb afresh the carbonic and hydrosulphuric acid. Our contemporary considers that the idea requires to be thoroughly investigated, with the assistance of more complete qualitative and quantitative analyses of the gases, before undertaking a trial of the system.

The handling and utilization of coke came before the meeting in two papers. M. de Brouwer, of Bruges, described his appliance for removing and quenching coke, which was illustrated in the "JOURNAL" for Jan. 7 last (p. 23); and M. François brought forward the subject of the screening of coke before breaking it. There is recognized utility in sorting the whole of the production of coke before commencing to break it, so as not to have to deal twice with the same pieces. The author proposed to substitute for one side of the hopper of the coke-breaker a grating of special form, placed at an angle of 45°, and having its upper bars 1½ inches distant, increasing gradually to 2½ inches at the lower part. This allows of the descent of the pieces of coke; and the grating never becomes blocked, even when the delivery is by a mechanical elevator. Two sizes of the coke comprising the bulk are separated in this way, and consequently have not to pass through the machine.

The use of gas for heating the ovens of pastrycooks and bakers was the subject of a communication by M. André, who has given considerable attention to this matter. The following figures refer to a pastrycook's oven, and show the saving effected by using gas instead of wood. With the latter material, the cost of heating the oven to a temperature of 300° C. for one hour daily was 456 frs. 25 c. per annum; and this one heating served for six or seven hours. Adding the rent of the store for the fuel, and the cost of cleaning, maintenance, &c., the total was 787 frs. 50 c. (£31 10s.). With gas, the oven was heated to 300° C. in 35 minutes, with a consumption of about 75 cubic feet of gas; and it was kept at this temperature for six hours by burning 255 cubic feet more—making 330 cubic feet per day, and costing 686 frs. 20 c. for a year. Adding 20 frs. for maintenance, the total was 706 frs. 20 c. (£28 5s.), with no expense for sweeping a chimney, no loss of time, and no rent of fuel-shed. By applying the principle of recuperation to the oven, an appreciable economy might be effected in the consumption of gas. The author appended to his communication designs of various types of gas-ovens for domestic purposes and for making lenses.

The motive power of acetylene has been studied by M. Ravel; and he gave the members a summary of his experiments, employing alternately acetylene, ordinary gas, and carburetted air in a gas-engine. According to his diagrams, a litre (0·035 cubic foot) of acetylene produces, in a 2-horse engine, work equal to 860 to 870 kilogrammetres. The power of acetylene, for this type of engine, would be about 2·1 times that of coal gas. The consumption of acetylene gas would be 16·25 cubic feet at atmospheric pressure, or rather more than 1 lb. in weight, per effective horse-power-hour.

M. Ed. Melon contributed an interesting paper on the working of the prepayment gas-meter system in Lille, a full abstract translation of which was given in the "JOURNAL" for the 11th ult. (p. 268).

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

The Annual Meeting of the above Association, which was held in Liverpool from the 16th to the 23rd inst., under the presidency of Sir JOSEPH LISTER, was not productive of much discussion on subjects in which our readers are more specially interested. The President devoted his address to the question of the interdependence of science and the healing art; and though he introduced some interesting remarks about the Röntgen rays, they were directed to emphasize the value of this wonderful discovery in physiological and surgical investigations. Turning to the addresses of the Presidents of the Sections, Professor J. J. Thompson, M.A., F.R.S., of Cambridge, who presided over the Mathematical and Physical Science Section, discussed chiefly the nature and properties of the Röntgen and other rays produced from a vacuum tube traversed by an electric current, and referred incidentally to the movement of the ether. He said it seemed to be conclusively proved that a solid body moving does not set in motion the ether at an appreciable distance outside it. There was, however, another class of phenomena relating to movement of the ether, which was worthy of consideration—viz., the effect of a varying electromagnetic field in setting the ether in motion. This was of great importance in the electromagnetic theory of light. In the Chemistry Section, the subject of Dr. Ludwig Mond's address was the history of the manufacture of chlorine, with special reference to the influence which the progress of pure science has had upon its development and simplification. In the section devoted to Economic Science and Statistics, Mr. Leonard Courtney, M.P., made his address a qualified defence of Individualism as opposed to Collectivism. He indicated the limits within which industries may safely be carried on by the State or by Municipalities, and warned his hearers of the dangers likely to arise from productive enterprises being undertaken by local authorities. In addressing the Mechanical Science Section, Sir Douglas Fox, the Vice-President of the Institution of Civil Engineers, sketched the progress made, generally and locally, in civil and mechanical engineering since the Association last met in Liverpool a quarter of a century ago. He stated the results of experience with regard to electric and other mechanical traction and tunnel construction; and he touched upon light railways, motor cars, the metric system, the scientific bases of foreign engineering, and the problems to be solved in the future. This address is dealt with in our editorial columns.

With regard to the papers, in the Chemistry Section, Professor Harold B. Dixon, F.R.S., read a short paper on "Reflected Waves in the Explosion of Gases." A number of photographs of a vertical tube containing an explosive mixture of gases were exhibited. These revealed the existence of a second disturbance of the nature of a sound-wave which passes back along the tube in the opposite direction to the flash, and at a much slower rate. The temperature and pressure corresponding to this secondary wave can be calculated; and it has thus been found that the pressure corresponds to that which can be measured by the application of mechanical means, while the fugitive pressure due to the actual explosion wave escapes measurement. In the discussion which ensued, Sir G. G. Stokes expressed the opinion that the luminosity accompanying the reflected sound-wave might be due to temporary compression of the gases already heated nearly to the point of luminosity. Professor F. Clowes, of Nottingham, read a paper on "Limiting Explosive Proportions of Acetylene, and Detecting and Measuring the Gas in the Air," the author's abstract of which will be found in another column. Dr. Haldane read a paper on "The Detection and Estimation of Carbon Monoxide in the Air," and gave a demonstration of the method he has devised. This depends upon the fact that carbon monoxide is readily absorbed by blood when the two are shaken up together. The amount of carbon monoxide present in the air with which the blood has been shaken can be ascertained very readily by the extent to which the colour of the blood is changed. Deaths in coal mines after explosions are usually due to carbon monoxide, which is extremely dangerous when breathed in small quantities for a considerable time. The author's method is capable of detecting 0·01 per cent. of this gas in air. Professor Clowes supplemented Dr. Haldane's remarks by a paper on "The Detection and Estimation of Carbon Monoxide by the Flame-Cap Method."

In the Mechanical Science Section, Mr. W. H. Preece, the

Chief Electrician to the General Post Office, said since the expiration of the Swan-Edison patents, many cheap and nasty electric lamps had been introduced into the market. He had, therefore, for the past two years been engaged in a series of exhaustive experiments, which he described, in order to establish a fair and reasonable specification for Post Office requirements. The object was to find an expeditious as well as trustworthy way of testing the efficiency and usefulness of electric glow lamps. A new test had been introduced which enabled users of such lamps to determine, in a few minutes, the behaviour of a lamp for many months. The test was extremely simple, and all users of lamps, by forwarding samples to central electric stations, ought to be able to have the quality of their lamps determined. A discussion followed, in the course of which a question arose as to the comparative cheapness of gas and electric lighting as illuminants. In reply, Mr. Preece said gas *per se* was cheaper to produce than electricity. This was especially the case if only an hour's continuous burning was taken into comparison; but electricity was found more economical for prolonged use, inasmuch as electric lamps could be placed exactly where they were required, and need be lighted only when they were actually wanted, besides the advantage that they were so easily turned on and off. The cost of electric lamps for irregular use, or for a number of hours' burning, was found to be little more than half that of gas. Mr. W. G. Walker read a paper on "Street Lighting by Incandescent Electric Lamps." He said these lamps were much cheaper than arc lamps for lighting side streets and roads in country towns. Arc lamps were more effective and better suited for busy main streets, but were too expensive for side roads. After describing the systems in use in various Continental towns and elsewhere, he said it was perfectly clear that the series system of overhead wires was suitable for scattered districts, and was as cheap as gas. Mr. J. Parry, the Municipal Engineer of Liverpool, described the water-works of the city.

At the close of the sectional work, a meeting of the General Committee was held, to receive the report of the Committee of Recommendations. Mr. A. G. Vernon Harcourt, one of the General Secretaries, read the synopsis of grants of money appropriated to scientific purposes by the General Committee. The total amount, divided among the different sections, was £1355; and the grants were approved. The following recommendation from the Mathematical Section was also adopted: "That a National Physical Laboratory be established, and for this purpose that the co-operation be invited of the Royal Society, the Royal Society of Edinburgh, the Royal Astronomical Society, the Institutions of Civil, Mechanical, and Electrical Engineers, the Chemical and Physical Societies, and other kindred societies, for securing this foundation."

At the concluding meeting, which was mainly of a complimentary character, Mr. Vernon Harcourt announced that there had been present at the meeting: Old life members, 330; new life members, 31; old annual members, 383; new annual members, 139; associates, 1384; ladies, 873; and foreign members, 41. The total number was 3181. He then read the grants made by the Committee of Recommendations. The vote of thanks to the President was moved by Sir W. Dawson, who expressed the hope that the Toronto meeting next year would be as great a success as that of Liverpool. Dr. J. H. Gladstone seconded the vote, which was enthusiastically accorded. Sir J. Lister, in a few feeling observations, expressed his thanks. He said he was glad to congratulate the Association on the splendid success of the meeting. From all the sections he had learned that the work done was of a high order.

The new President is Sir J. Evans, K.C.B., F.R.S.

Acetylene Motor Cars.—A firm of Italian engineers has recently built some miniature motor cars for which acetylene serves as the motive power. The charge consists of acetylene diluted with fifteen times its volume of air; and with this mixture it has been found unnecessary to use water for cooling the cylinder. The method of igniting the charge has not been divulged. According to the "Gastechniker," the motors maintain a speed of 600 revolutions throughout a working period of 15 hours. The weight is only about 20 lbs.; and 0·8 brake horse power is developed. The cost of working is said to be about 0·6d. per hour.

Removing Incrustations from Water-Pipes.—The *Génie Civil* recently contained some particulars on the above subject. When taking up some water-pipes, the interior diameter was found to have been reduced by from 1·57 to 2·76 inches by incrustation; and as it was desired to relay the pipes on another line, an endeavour was made to clean them by immersion in a bath of dilute hydrochloric acid. After several applications of the acid, no results were perceptible, probably because the deposit was schistose rather than calcareous. After the failure of this attempt, two lengths of pipe were put on the ground parallel to each other, and about 6½ feet apart. Across them was placed a layer of 15 pipes, then 15 in the opposite direction, and so on up to seven or eight rows. The interstices between the pipes having been filled with combustible, the whole was set on fire; and after it had cooled, the pipes were scraped out and cleaned. Out of 137 pipes, about 10 feet long, that were thus treated, only six were rejected on account of cracks; and the cost of the operation was about 58 c. per metre run.

LIMITING THE EXPLOSIVE PROPORTIONS OF ACETYLENE, AND DETECTING AND MEASURING THE GAS IN THE AIR.

The following is the abstract of the paper on the above subject read by Professor F. CLOWES, D.Sc.(Lond.), F.I.C., of the University College, Nottingham, at the recent meeting of the British Association, as mentioned in the notice of the proceedings which appears in another column:—

The value of acetylene as an illuminant, and the discovery of its ready production from calcium carbide, have led to the manufacture of this gas in some quantity; and acetylene will probably be dealt with in still larger volume in the near future. It becomes, therefore, important to devise methods of detecting its presence in the air, arising from leakage and escape, and to measure the percentage of the gas present at any place. It is also important to ascertain what proportions of the gas, when present in mixture with air, will lead to explosion if the mixture should be kindled.

The detection of small proportions of the gas will not be readily effected by its smell when it is prepared in a state of purity. At present the smell is made much more pronounced by the impurities which the commercial gas contains. Further, the smell will not in any case furnish a means of measuring the proportion present in the air. The method applied by the writer to the detection and measurement of fire-damp and coal gas in the air, however, serves for detecting and measuring acetylene as well.* A small hydrogen flame, set to either 5 or 10 millimetres in height, as may be necessary, shows a pale but well-defined "cap" in air containing any proportion of acetylene less than the lowest explosive proportion. When the hydrogen flame is exposed to the air to be tested for acetylene in a darkened space, it is at once tinged yellowish-green. The bluish pale cap has the following heights with varying proportions of acetylene, when the hydrogen flame is 10 millimetres in height:—

0·25	per cent.	gives	17	mm.	cap.
0·50	,,	,,	19	,,	,,
1·00	,,	,,	28	,,	,,
2·00	,,	,,	48	,,	,,

When the hydrogen flame is reduced to 5 millimetres:—

2·50	per cent.	gives	56	mm.	cap.
2·75	,,	,,	79	,,	,,

A convenient portable form of apparatus was shown by the writer, which enabled air to be passed readily over the standard hydrogen flame in a darkened vessel, and which quickly furnished the reading of the height of the cap.

In determining the limits of explosibility, when acetylene is mixed in gradually increasing proportion with air and kindled, the writer adopted a simple method, referred to at the last meeting of the Association. It was found that air must contain at least 3 per cent. of acetylene before it can be kindled by a flame and the mixture caused to burn throughout. As the proportion of acetylene is increased, the explosive character is augmented. When 22 per cent. of acetylene is present, carbon begins to separate during the burning. The amount of carbon which separates increases until the explosive character of the mixture disappears. This point is reached when 82 per cent. of acetylene is present in the air.

The limiting percentages in air which are explosible are accordingly as follows, and may be compared with those already determined by the writer for other combustible gases:—

Acetylene	3 to 82
Hydrogen	5 ,, 72
Carbon monoxide	13 ,, 75
Ethylene	4 ,, 22
Methane	5 ,, 13

It will be seen that acetylene gives a wider range of explosive proportions than any other of these gases does. Probably this is due to its endothermic nature, which leads to the gas being able to generate heat by its own decomposition. Heat thus generated would undoubtedly aid in causing explosion, and would thus extend the limits of explosive mixtures.

THE PRODUCTS OF COMBUSTION OF COAL GAS AND THEIR INFLUENCE ON HEALTH.

The following is an abstract-translation of an epitome in the "Zeitschrift für Beleuchtungswesen" of researches carried out by Herr CHR. GEELMUYDEN at the Physiological Institute of Christiana University:—

Christiana gas of the following average percentage composition was used: Hydrogen, 47; methane, 36; heavy hydrocarbons and benzene, 4; carbonic oxide, 8; carbonic acid, 2; nitrogen, 2 to 3. It also contained from 30 to 35 grains of sulphur compounds per 100 cubic feet. Complete combustion furnished carbonic acid, aqueous vapour, small quantities of sulphurous acid (which was soon changed to sulphuric acid), and traces of oxides of nitrogen. The nitrogen, however, remained for the most part unaffected. The object of the experiments was to ascertain whether, in the ordinary burners, other substances were formed which might have escaped detection by the usual methods of technical gas analysis, and whether combustion

* See "JOURNAL," Vol. LXVII., p. 1315.

was generally complete or not. Batswing, argand, and Welsbach burners were used.

The batswing and argand gas-burners left no hydrocarbons or carbonic oxide unconsumed in the products of combustion; but the Welsbach burner gave small quantities of unconsumed carbonaceous bodies. Thus in one test, 2 per cent. of the carbon of the gas was not burnt to carbonic acid. But even if this was wholly carbonic oxide, it would scarcely be detrimental to health. The degree of completeness of combustion appeared to be more dependent upon the construction of the burner than upon the quality of the gas. Careful testing did not reveal the presence of hydrocyanic acid; but sulphurous acid, of necessity, was present. Products of the oxidation of nitrogen were found only in very small amounts. A hundred volumes of the products of combustion contained 73·9 volumes of hydrogen and 26·1 volumes of carbonic acid, with 0·000364 volume of sulphur dioxide. The Christiana gas was absolutely free from compounds of arsenic. Subcutaneous and intravenous injections on rabbits of the water formed by the combustion, did not indicate that it contained poisonous constituents. Experiments on animals with air contaminated by the combustion of gas showed that gas lighting is not necessarily injurious to health. The blood did not contain carbon monoxide or methane hæmoglobin.

Tests were made on the air in rooms with regard to ventilation and the number of gas-flames. In one case, all openings and means of escape were blocked up; and in another, thirteen flames were used where five or six would ordinarily suffice. The amount of carbonic acid in the air rose to 1 per cent. in eight hours, and the temperature to 86° Fahr. Nevertheless there was no odour of nitrous acid; but the heat was distressing. One per cent. of carbonic acid is seldom found in the air of rooms lighted by gas; but 0·6 to 0·8 per cent. is often met with when the ventilation is bad. When it is good, not more than 0·2 to 0·3 per cent. is present.

In the experiments on animals, the amount of carbonic acid rose to 3 per cent. without perceptible signs of injury to them. Only under exceptional conditions did the sulphurous acid in the air exceed 0·0015 per cent.; and when the ventilation was good, it amounted to only 0·0000002 to 0·0000004 per cent. The heat developed is much against gas lighting; but it is, however, less than that developed by candles or petroleum. The action of coal gas on plants was studied, and was not found to be unfavourable, provided the services were sound and steatite burners were used.

ANOTHER SULPHATE OF AMMONIA WORKS IN SCOTLAND.

Messrs. W. Baird and Co., Limited, the eminent firm of iron-masters at Glasgow and Gartsherrie, and known as the Eglinton Iron Company in Ayrshire, where they have for many years had several blast-furnace establishments, have just completed important alterations and extensions at their Eglinton Iron-Works, Kilwinning—an old-established seat of the pig iron industry. Some three or four weeks ago, three new blast-furnaces of the most improved description, together with hot-air stoves of the Ford and Moncur type, were lighted for the first time; and the blast was put on in the course of a few days later. Two of the furnaces are for a time to be engaged in the production of ordinary pig iron; and in the other hematite iron ore is being used. After the blast had been in operation for about a couple of days, a complete plant, erected in conjunction with the furnaces, for the recovery of the tar and ammonia contained in the effluent gases, was also brought into operation for the first time.

The hot effluent gases are conveyed from the furnaces by means of a malleable iron main, 7 ft. 6 in. in diameter, to the site of the recovery plant, in which they are so dealt with that they readily yield up the valuable bye-products with which they are charged. This plant consists chiefly of a series of washers, condensers, pumps, exhausters, &c.; and after the furnace gas has been deprived of its ammoniacal and tarry vapours, it is passed onwards in a separate main, 5 feet in diameter, as gaseous fuel, to the boiler furnaces, to get up steam and to generate a high temperature in the hot-air stoves. On its way from the blast-furnaces, the effluent gas is first passed through a primary (or tar) washer, and then through an atmospheric condenser, and next in order to the washers, properly so called. In the case of the recovery plant set up at Kilwinning, scrubbers are entirely dispensed with, so that it is very much simpler than any other plant erected in Scotland for the recovery of tar and ammonia from blast-furnace gases. The washers last referred to are long iron boxes containing water, and are divided into a series of compartments by means of plates so arranged that the gas has to bubble through the water. The compartments of the washer are of very large area compared with that of the tubes carrying the gas, the flow of which is consequently slower; and the edges of the plates under which the gas passes are serrated by a set of very fine teeth, so that in addition to the gaseous current being slow, it is broken up into innumerable small bubbles, and in this way intimate contact with the water and perfect solution of the soluble constituents of the effluent gas are secured. The gas next passes to the exhauster; then through another washer, exactly like the first; and lastly it flows away to be burned, as already mentioned.

After the agitation and cooling of the furnace gases, the tar and ammoniacal liquor pass into separators, where, by an ingenious arrangement, the sunk as well as the floating tars are automatically separated from the liquor. The tar is again brought into contact with the hot gases in the tar washer. In this way a double purpose is served—some of the water is driven off from the tar, and fresh particles of the latter are extracted from the gas. Subsequently the tar is distilled down to pitch; and the water which first comes off is cooled and sent back through the plant, while the pitch oil which follows is run into sale tanks. In due course, the ammoniacal liquor is passed into stills, and sulphate of ammonia is obtained. The spent liquor is settled in a tank, whence it is partly used as feed-water for the team-boilers; and then it is finally run into an evaporating chamber, from which the deposit is removed and burnt dry.

This plant is much cheaper than that which was first erected at the Gartsherrie blast-furnaces, some fifteen or sixteen years ago, according to the patent of Messrs. Alexander and M'Cosh (two of the partners of the firm), and afterwards repeated at two of Messrs. Baird's works in Ayrshire. From 23 to 25 lbs. of sulphate of ammonia per ton of raw coal charged into the blast-furnace is generally considered to be a good yield; but it is confidently anticipated that something like 30 lbs. may be got in regular working at the Kilwinning blast-furnaces when they and the new recovery plant are in good order.

The new plant has been designed by, and erected under the superintendence of, Mr. Andrew Gillespie, Consulting Engineer, of Glasgow. In order to get the work done as expeditiously as possible, it was distributed among a number of contracting firms, among whom were the Barrowfield Iron-Works Company, Limited, Messrs. Hanna, Donald, and Wilson, Messrs. Newton, Chambers, and Co., Limited, and the Whessoe Foundry Company, Limited. The excavating, foundation, and building contract was executed by Messrs. Hugh Symington and Sons, of Coatbridge; and the time occupied from starting the foundations until the works were put into operation was only about twelve months.

Condemnation of the Candle as a Standard of Light.—A Sub-Committee of the American Institute of Electrical Engineers, appointed in 1893 to investigate the subject of a suitable standard of light for photometric purposes, has recently issued a preliminary report. Of all the standards thus far used, they find the candle the least reliable. It is thought that the difficulties attending the use of a flame standard may be overcome by the adoption of one consisting of some surface electrically heated to a standard temperature.

Popular Science Lectures in Manchester.—Manchester has always been to the front in the work of popularizing science; and the list of free lectures to be delivered in the Chemical Theatre of Owens College on Saturday afternoons during the coming session shows that she has not receded from her position. Professor Boyd Dawkins is to give three discourses on "The Geological History of the District round Manchester;" and others by equally eminent men will follow. Among the Monday evening lectures is one by Professor Roberts-Austen on "The Electric Furnace;" and another by Professor Harold B. Dixon, M.A., F.R.S., on "The Nature of Flame."

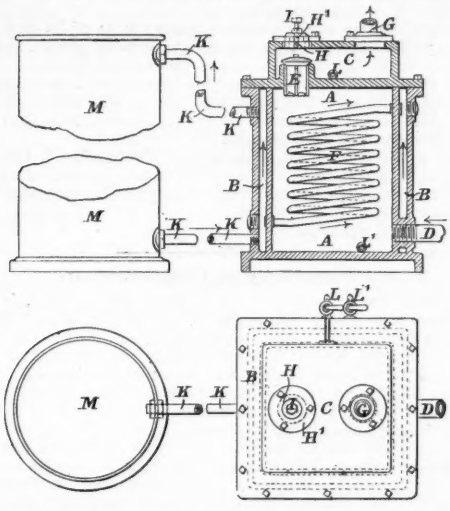
Preventing Frauds by the Tilting of Meters.—M. Bruxelles, of Grenoble, has devised an arrangement for preventing frauds resulting from the tilting of meters. His idea is to solder upon the meter, at the junction of the outlet-pipe, a compartment divided by a partition perforated with a circular orifice. A ball, of rather larger diameter than that of the orifice, is placed in the compartment, in which it moves along upon two horizontal guides made to slope slightly towards the back of the meter. When the meter is absolutely level, the ball leaves the orifice open, and the gas passes freely. If the meter is tilted forward, the ball falls over the orifice, and closes it in such a way as to prevent the passage of gas.

The Use of Water-Meters at Lexington (U.S.A.).—A recent number of "Engineering News" contained a table, furnished by Mr. S. A. Charles, the Receiver of the Lexington (Ky.) Hydraulic and Manufacturing Company, showing the consumption of water through metered and unmetered taps in the town for the ten years from 1886 to 1895 inclusive. The use of meters has rapidly increased in that period until now 90 per cent. of the taps are thus controlled. In the first-named year, the figures were as follows: Average number of taps metered, 33; total consumption, 11,738,610 gallons; average per meter, 355,715 gallons; average number of taps not metered, 238; total consumption, 125,706,640 gallons; average per tap, 528,179 gallons. In 1890, the figures stood thus: Average number of taps metered, 486; total consumption, 75,576,000 gallons; average per meter, 155,494 gallons; average number of taps not metered, 254; total consumption, 209,215,285 gallons; average per tap, 823,682 gallons. Last year, the figures were as follows: Average number of taps metered, 1100; total consumption, 105,771,750 gallons; average per meter, 96,161 gallons; average number of taps not metered, 233; total consumption, 304,893,045 gallons; average per tap, 1,367,278 gallons. The figures are interesting as showing over the period named increased consumption with the unmetered taps, and the reverse with the metered ones.

REGISTER OF PATENTS.

Gas-Engines.—Gass, A., of Belfast. No. 16,556; Sept. 4, 1895.

This invention has reference to gas-engines of the "Improved Crossley" type (as described in patent No. 2081 of 1876); and it consists in the use of a water-jacketed chamber or box, into which the exhaust from the engine passes, and of a drop-valve placed in such a position as to allow of the free exit of the exhaust from the chamber, and so arranged as to close when the pressure within balances the atmospheric pressure outside. The rarified gas or air is condensed in the chamber; and the exhaust-valve of the engine is kept open during the entire inward stroke, so as to communicate with the chamber, and



allow the atmospheric pressure to act on the piston. The water in the jacket of the chamber is circulated similarly to that in the cylinder-jacket of the engine. Instead of, or in addition to, the water-jacket, the rarified gas or air may be condensed by the circulation of water through a worm or coil of pipe within the chamber.

Above the water-jacketed chamber or box is arranged a secondary chamber or box, which encloses the drop-valve, and carries a pipe to conduct the surplus exhaust from the chamber to the open atmosphere. The water-jacketed chamber may be placed at the side or in the base or bed of the engine. At the bottom of the chamber, there is a box or chambered valve or piston, worked alternately by the pressure within and outside, so as to discharge any water that might accumulate in the process of condensation; but this would only be essential if the condensation were very rapid and at very low temperature.

The exhaust-valve of the engine is timed to open early on the outward stroke, and to remain open during the entire inward stroke—thereby allowing the exhaust to escape from the cylinder of the engine by free expansion. Thereupon the drop-valve is lifted for an instant by internal pressure, allowing the surplus to escape, while the volume of exhaust that remains in the chamber is partially condensed. This makes a fairly complete vacuum to act on the piston-head, bringing the pressure of the atmosphere into action, and driving the engine by explosion and atmospheric pressure alternately.

In the illustrations, A is the water-jacketed chamber or box placed at the side of the engine, showing the secondary chambers or boxes C, the water-space B, the lead of the exhaust from the engine D, the drop-valve E, the worm or coil of pipe F, the pipe G through which the surplus exhaust escapes, an opening and cover H H¹ for access through the secondary chamber or box to the drop-valve, with screw I for adjusting the lift of the valve, circulating-pipes K to connect the water-jacketed chamber or box with the water-tank, and a pipe L L¹ to drain each chamber or box. M is a water-tank in connection with the water-jacketed chamber or box.

Gas-Burners.—Holliday, T., of Huddersfield. No. 17,997; Sept. 26, 1895.

This invention relates to a burner for rich gas (such as acetylene), and is designed to enable the gas to be burned along with air for illuminating purposes. It consists in the combination with an ordinary union-jet gas-burner of a small injector, the motive force of which is the rich gas to be diluted, and which force draws in air through apertures made for the purpose—the quantity of air being regulated by the difference in size of the gas-jet and the opening opposite it, through which the gas and air are injected by the jet and by the pressure of the gas. The distance between the gas-jet and the opening is sufficient to allow the entrance of the air, for which purpose apertures are made between the two.

Fig. 1.

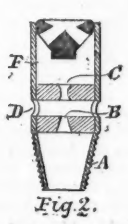


Fig. 2.

In figs. 1 and 2, A screws into the gas-fitting. It is provided with a small hole B for the exit of the gas, and is accurately adjusted so that the jet of gas is projected through the hole C. D are holes to admit air, which is drawn with the gas through the constricted tube C into the mixing chamber F, from which the mixture issues through a union-jet or slit gas-burner for ignition. The hole C being much larger in diameter than the hole B—which, at (say) 6 inches of pressure, is of such a size that it will allow 1 foot per hour of acetylene gas to pass—will supply a gas-burner of No. 4 to No. 9 size with sufficient mixture to give a good light.

Gas-Producer.—Clouard, A., of Caen, France. No. 20,430; Oct. 29, 1895.

This gas-producer is composed of a vertical furnace (of circular or rectangular section), constructed of refractory materials, and in the interior of which are provided recesses or channels connected to conduits, for enabling the gases which enter the fuel contained in the furnace, or which leave the same, to be easily conveyed away. The fuel is placed either on the bottom of the ash-box or on a grate placed at the bottom of the furnace. Suitable pipes for conducting the air and steam necessary for the operation of the apparatus, and for communicating with the various channels and the ash-box, are provided. Above the furnace is a space divided at its upper part by a partition, one side of which serves as a reservoir for the fuel, which, extending below the partition, descends into the furnace in accordance with the requirements. In the other side of the partition, a coke-breaker is placed, comprising vertical rods or prongs, fixed at their upper extremities to a plate, itself fixed to a rod working freely through an upper cover; so that by reciprocating the rod vertically from the outside, the rods or prongs on the inside are caused to strike the coked fuel in the upper part of the furnace, so as to permit the free descent of fresh fuel. The furnace being filled with incandescent coke, the current of mixed air and steam is divided so as to form two points for the combustion in the same furnace—one at the bottom of the furnace, and the other a little below the upper part. The gases formed by the combustion in this part are divided into two portions—one rising towards the layer of fresh coal, in order to effect the distillation of it; and the other descending towards the outlet conduit, in order to encounter there the products of the distillation, and to effect its transformation into permanent gaseous hydrocarbons. The products of the distillation in the upper part are then conducted back into the mass of incandescent coke, in order to effect its decomposition.

Carburetting Air for Illuminating and Heating Purposes.—Notkin, N., of Moscow. No. 20,667; Nov. 1, 1895.

This invention relates to a method of effecting the automatic and continuous carburetting of air for illuminating and heating purposes, wherein the air is made to pass in a downward direction through a receptacle charged with porous or loose material saturated with hydrocarbon—such downward motion of the air being effected by its natural increase of the density, without the use of mechanical means. The apparatus for carrying out the carburetting of the air consists of a receptacle divided by horizontal partitions into superposed chambers, which communicate with each other in such a manner as to form a zigzag channel, through which the air is made to travel in a downward direction, and which is filled with loose or porous material saturated with light fluid hydrocarbon; the air being made to enter the receptacle at the top, and pass from the bottom of it to the burners. For regulating the supply of air to the carburetting apparatus, the patentee uses a screw stopper or cap, having notches or slots at the side, which are more or less closed on screwing the stopper in or out. The loose or porous material contained in the chambers of the carburettor is preferably saturated with commercial benzine of the specific gravity of ·712, or with a mixture of four parts of benzine with one part of petroleum of the specific gravity of ·825, so that the mixture will have a specific gravity of ·735 at 15° C.

Generating and Storing Acetylene.—Appleby, E., of Leyton, and Harris, H. F., of London Fields. No. 5976; March 17, 1896.

This invention consists of a cylinder of iron or steel, in which is placed the calcic carbide or other material yielding acetylene on treatment with water. The storage holder is open at the bottom, and is placed in another vessel or tank (of about double the cubic capacity of the holder), and securely bolted to it, so as to prevent the holder being raised by the buoyancy of the gas. For the purpose of regulating the water supply to the carbide in the generator, a ball or float is placed in the tank containing the gasholder, so as to operate the cocks or valves of the water-meter or measuring-tap employed.

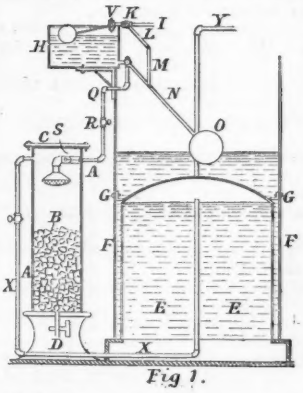


Fig. 1.

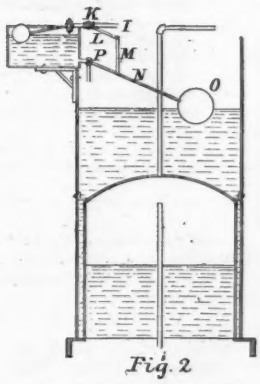


Fig. 2.

Fig. 1 illustrates the apparatus. A is the generator or cylinder in which the carbide B or other material is placed. C is a gas-tight cover; and D is a cock placed at the bottom of the generator for the purpose of facilitating the removal of the lime and water residue after the carbide has been exhausted. E is the gasholder

placed in the tank F, and secured to the sides of it by the bolts G, so that it cannot be lifted by the buoyancy of the gas. H is a water meter or gauge; the water being supplied to it by the pipe I, provided with the stopcock K. The spindle of this stopcock is connected, by the pivoted pieces L M, with the ball and lever O N. The lever N is also connected with the spindle of the cock P in the pipe Q. This pipe is connected with the water-meter H and with the cylinder or generator A, as shown in fig. 1, and is for the purpose of discharging the contents of H on to the calcic carbide. It is provided with a non-return valve S, to prevent the gas escaping through it, and also with a rose so that the water may be sprayed over the carbide. The spindles of the cocks K and P are so arranged that, when the ball and lever N O are down (as in fig. 1), the cock P will be opened, and so allow the contents of H to run on to the carbide in the generator; and the cock K will be closed, and so prevent more water running in until the ball and lever have risen to the position shown in fig. 2 The cock P will then be closed, and the cock K opened; thus shutting off the supply of water to the carbide, and opening the supply of water to H, which is provided with a small ball and lever operating the cock V, for the purpose of cutting off the supply of water.

The apparatus works in the following manner: Upon the cock R in the pipe Q being opened, and the ball and lever being as in fig. 1, the water from H at once flows down to the carbide. Acetylene gas is at once generated, and flows through the pipe X, which passes through the bottom of the tank F into the gasholder E, and immediately displaces the water with which it has been filled. This displaced water collects above the holder in the tank F; and, as it rises, it carries the ball and lever N O up—thus operating the cocks P K as described. The gas is drawn off for use by the pipe Y.

Gas-Motors.—Duryea, J. F., of Springfield, Mass., U.S.A. No. 7036; March 31, 1896.

The principal claim for this invention is for the combination in a gas motor of: (1) A piston cylinder; (2) an injector-chamber and a valved passage communicating therefrom with the cylinder; (3) a service-tank and an injector-tube communicating therewith, and extending rearwardly into the injector-chamber; (4) a partition which transversely divides the injector-chamber, and which has a longitudinally passaged thimble extension widely surrounding the injector-tube; (5) an air-chamber, having communication with the rear compartment of the injector-chamber; and (6) means for periodically igniting the motor fluid, which is entered at the rear of the piston.

Vapour Burners and Oil-Gas Apparatus.—Freeny, V. I.; a communication from P. Carmien, of Montbeliard, A. Yvonnet, of Roanne, and M. Billion, of Paris. No. 10,568; May 16, 1896.

This invention relates to regenerative apparatus, and means for producing and burning oil gas, whereby it is possible to dispense with the ordinary gasholder, lead or iron gas-pipes, gas-meter, governor, and similar accessories, and to control the supply to burners arranged adjacent to, or at a considerable distance from, the source of supply. The invention also relates to means "for producing gas burning with an almost colourless flame, and which gas is renewed proportionately to its combustion." The principal material employed for the preparation of the gas is "ordinary oil of petroleum, contained in a reservoir placed at a distance of from 2 to 100 metres from the burner if desired."

APPLICATIONS FOR LETTERS PATENT.

20,257.—Clarke, A., "Atmospheric gas-burner." Sept. 14.
20,258.—Hehner, O., and Prideaux, R. M., "Incandescent mantles." Sept. 14.
20,283.—Köhne, H. A., "Improvements in bunsen burners." Sept. 14.
20,294.—Riche, E. Le, "Incandescent gas lamps or burners." Sept. 14.
20,316.—Sime, I., "Liquid measures." Sept. 14.
20,331.—Clement, C. P. J., and Krohn, H. von, "Lighters for incandescence gas-lamps." Sept. 14.
20,358.—Symons, P., "Supporting incandescent mantles." Sept. 15.
20,383.—Dixon, R. M., "Gas lighting apparatus for railway cars and the like." Sept. 15.
20,401.—Sugg, W. T., "Gas-lamps." Sept. 15.
20,406.—Trost, R., "Acetylene gas-lamps." Sept. 15.
20,433.—Giroud, L., and Sappey, M., "Coin-freed gas-meters." Sept. 15.
20,501.—Hill, H., "Improvements in the manufacture of thread foundations or caps for incandescent mantles." Sept. 16.
20,506.—Tourtel, J., Tourtel Gas and General Engineering Company, Limited, and Davidson, J., "Automatic appliances for extinguishing lamps." Sept. 16.
20,529.—Gastine, G. S. T., "Production of acetylene." Sept. 16.
20,550.—Crichton, J. W., "Gas-governors." Sept. 17.
20,583.—Burns, R., and Gardner, W., "Atmospheric gas-burners." Sept. 17.
20,598.—Deuther, J. A., "Improvements in and relating to calcium carbide and the treatment of the same to form a uniform composition." Sept. 17.
20,599.—Deuther, J. A., "Apparatus for producing acetylene gas." Sept. 17.
20,602.—Rickman, W. B, "Production of acetylene gas." A communication from Julius Pintsch. Sept. 17.
20,608.—Türr, R., "Lamps for generating and burning acetylene gas." Sept. 17.
20,626.—Cripps, F. S., "Fittings for incandescent gas-lamps." Sept. 18.
20,694.—Thompson, W. P., "Apparatus for generating and storing acetylene gas." A communication from Victor Italo Comucci. Sept. 18.
20,759.—Southey, A. W., "Internal combustion engines." Sept. 19.

New Water-Works for Hollington.—The Local Government Board have sanctioned the borrowing of £1600 for the purpose of new water-works at Hollington by the Battle District Council.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

Lord Rayleigh on Light.

Sir,—I regret that Mr. Newbigging's letter on the above subject, which appeared in your issue for the 8th inst., escaped my attention until to-day. It is now two years since Mr. Newbigging discussed with me his views on the subject of transverse rays. He had at that time been following up the question in its relation to the illuminating power of gas and other artificial lights; and, agreeing as I did with his conclusions, I expressed to him my regret that he had not forwarded to you the letter to which he refers.

The subject is one which presents many points of interest; and it would be well if Mr. Newbigging, or some other person having the necessary time at his disposal, would pursue the inquiry so far as it relates to artificial light. Lord Rayleigh's recent lectures on light form an excellent incentive to those who have not previously considered the subject. Mr. Newbigging needs no such incentive, as he has already made several investigations thereon.

Perhaps it is not too late to suggest that the inquiry, if followed up by a careful observer, and suitably illustrated by experiments, would form an excellent subject for a lecture at any of the next year's meetings of gas engineers and managers.

Edinburgh, Sept. 19, 1896. J. Hepworth.

The Permanency of Illuminating Gas.

Sir,—Mr. Young's letter in your issue of the 1st inst., is a very comprehensive and valuable appendix to his paper on "The Permanency of Illuminating Gas" (*ante*, p. 166). I have studied it carefully, and with the deepest interest; and it has revealed to me the existence of a fundamental difference between the point of view from which Mr. Young sees the questions under discussion, and that from which I have hitherto looked at them. It is upon record that on several occasions I have given expression to the opinion that the gas produced under the usual conditions from ordinary bituminous coal is unsaturated at ordinary temperatures. From Mr. Young's letter, and the further light which it throws upon his paper, I understand his teaching to be that such gas is saturated—saturated with naphthalene vapour. I have contemplated my common coal gas from the new standpoint; and there appear to me to be objections to the "saturated" view which are not covered by Mr. Young's very clear exposition of the subject.

My first difficulty has reference to the addition of vapour at a late stage in condensation. I see that, if naphthalene vapour is still present in large volume after the tar has been removed, and if friction and moisture have no appreciable influence upon its fate, the gas should be saturated. Under these circumstances, I understand Mr. Young to say that the addition of hydrocarbon vapour will, at least in some measure, displace naphthalene, which separates, not in the crystallized form, but as a finely-divided powder, and is wafted forward in the current of gas. He states that in this condition it is liable to be rubbed out of the gas by friction. This is evidently true, and a point with which I shall deal presently. But supposing it all to survive the ordeal of friction, luminosity ought only to increase in proportion to the intrinsic value of the added vapour; for, by hypothesis, there is no more naphthalene present than there was before—in truth, not so much, volume for volume. But the observed fact is that the increase in illuminating power has been twice, three times, and on occasion even four times greater than such intrinsic value. This is to me a real difficulty from the standpoint that the gas is saturated with naphthalene before such addition of vapour. If, however, we take into account the admitted effect of friction upon the finely-divided powder, the difficulty is so enhanced that it becomes almost impossible to believe in the existence of naphthalene "sleet" under the particular circumstances; for the friction of purification, wet and dry, is so great that it is hardly conceivable that any "sleet" could fail to be rubbed out of the gas. I therefore maintain that, on the powder hypothesis, gas ought actually to be of lower illuminating power after such addition of vapour during condensation than it was before, because a rich illuminant has been displaced by a poor one. At any rate, I think there is little reason to fear, if indeed the "sleet" has a "local habitation" in the gas as well as a "name," that it will, after surviving the friction of the works, succumb to the skin-friction of the district mains and service-pipes.

My next point is that naphthalene deposits do not necessarily prove "saturation;" for evidence is forthcoming of the fact of such precipitation by unsaturated gas, and of the subsequent re-absorption of the deposit. The latter fact may not be surprising or uncommon; but it is noteworthy under the special circumstances which I proceed to describe. At the Old Kent Road works, it has been customary, for several years past, to watch (through glass windows) the internal condition of the outlet-mains of certain station meters. Thermometers have been placed in these mains close to the windows. In these mains, naphthalene in the crystallized form is observed to be deposited, to grow for a time in volume, subsequently to diminish, and even to disappear with great rapidity. The gas, which enters the purifiers at a temperature little above that of the atmosphere, will be raised 20° to 30° Fahr., or even higher, in its passage through the active boxes, Assuming the gas entering the purifiers to be saturated, it is evidently unsaturated with hydrocarbon vapour as it rises in temperature, but will, other things being equal, again become saturated upon falling back to the inlet temperature. This fall is not completed at the Old Kent Road until after measurement; the average temperature at the meter outlets during last half year having been 4° higher than that at the inlets to the purifiers. The increase in the volume of gas attributable to a rise in temperature of 4° Fahr. is roughly 0·8 per cent. (8-10ths of 1 per cent). Apart from the temperature, there is an increase in volume due to the reduction in pressure between the inlet to the purifiers and the outlet of the meters. This is measured by an average of 7½ inches of water, and amounts roughly to 1·75 per cent. From this a deduction of 1 per cent. in volume must be made for

impurities removed. This, though apparently small, is the normal quantity left for dry purification at the Old Kent Road, where purification by ammoniacal liquor is very efficient. Therefore, at the outlet of the meters, the gas has expanded 0·8 per cent. in volume under the influence of temperature, and a further 1·75 per cent. under that of reduced pressure—together, 2·55 per cent. in volume; and, after deducting 1 per cent. for impurities removed, there remains a net expansion of 1·55 per cent., offering to the vapours additional space for diffusion. The gas therefore is unsaturated; nevertheless, it sometimes deposits naphthalene, and sometimes absorbs it. It has seemed unnecessary to make any deduction for the increase in volume due to the expansion of the vapours themselves, which cannot, by their expansion, offer additional space for their own diffusion, because the vapour volume is so small a percentage of the whole that its share of the total expansion may be neglected.

So much for the observed facts. But the important point is that precipitation and absorption are dependent upon the varying condition of the contents of certain oxide purifiers which are used merely as "catch" boxes to absorb final traces of sulphuretted hydrogen, and in which chemical action is so insignificant that its effect upon temperature may be neglected. Precipitation precedes, absorption follows, the removal and replacement of the charges. The material removed is always much wetter than that which replaces it. What are the causes of these varying phenomena? I submit the following theory: The gas, being very considerably raised in temperature in passing through the lime purifiers, is able to take up a larger volume of aqueous vapour; and it saturates itself with the vapour given off by the water in the purifier lutes and that in the purifying material. Immediately after leaving the lime boxes, the gas falls rapidly in temperature, and aqueous vapour is condensed. The moisture separates in the finely-divided condition as mist or fog. The mist is arrested by friction against the oxide in the purifier, and the oxide absorbs the moisture. As it grows wetter, it becomes more pervious to the passage of the gas. Friction decreasing, the mist gets through in larger quantity, and, growing in volume as the temperature is reduced, finally falls. Meanwhile, aqueous vapour is also being condensed as dew upon all surfaces cooler than itself. Under these conditions, naphthalene is observed to be deposited in the crystallized form. If the precipitation of the naphthalene is not attributable to the influence of the mist or dew, to what cause is it traceable? for, though saturated with aqueous vapour, the gas is unsaturated with hydrocarbon vapours. Friction, too, may be disregarded, for that factor is constant; and absorption follows the change of material. Now, in the newly-charged purifier, the dry oxide is denser, and offers greater resistance to the passage of the gas, which passes on comparatively dry. It is under these circumstances that, as has been observed for years, the naphthalene crystals previously deposited evaporate or sublime into the drier gas, and in so doing prove it to be unsaturated. The varying factor is moisture—*i.e.*, condensing or condensed aqueous vapour.

My next difficulty is that of comparative illuminating power. Saturated gas made in summer at 65° Fahr. would evidently contain a much larger volume of naphthalene vapour than saturated gas made in winter at 32°; and, naphthalene being the richest illuminant which the gas carries, the illuminating power should, I think, fall to a far greater degree in winter compared with summer than is observed.

Among the consequences which follow the addition of hydrocarbon vapour to coal gas after purification, Mr. Young agrees that reduced deposits may be included; and he attributes the retention of the naphthalene vapour in diffusion to the increase in bulk due to the added vapour, which affords additional "elbow-room," so to speak, for it. So that, volume for volume, the enriched gas is not so highly charged with naphthalene as before. This is evidently true. But the average increase in bulk due to the employment of carburine vapour does not exceed one-half per cent. per added candle. Experiments (not my own) are on record showing that carburine yields 30 cubic feet of vapour per gallon, and that 1¼ gallons are required per 10,000 cubic feet per added candle. Taking 1¼ gallons per candle per 10,000 cubic feet for average work, the vapour produced will be 45 cubic feet—an increase in volume of 0·45 of 1 per cent.—not a great quantity after all.

In his summing up of the Maxim-Clark process, Mr. Young offers a choice of alternatives to those who would prevent naphthalene troubles by its employment: (1) To use such a quantity of vapour as will give sufficient increase in volume to retain the vapour by offering further space for its diffusion. (2) To use such a quantity as will bring about such a balance between the saturation-point of the gas with naphthalene and its saturation-point with other hydrocarbon vapours, that they shall be simultaneously condensed and deposited as the gas cools and run together to the drip-traps. The latter method certainly is not adopted in South London; for neither in the works nor in the district are liquid hydrocarbons found in the drip-traps. To bring about such a result deliberately would, I think, be very poor economy. But supposing the former method to be chosen, what becomes of the finely-divided naphthalene which, as Mr. Young believes, must accompany the addition of such vapour to a saturated coal gas? Mr. Young's views on this point are not, I think, stated with that transparent clearness which is so characteristic of his utterances. He considers that, if produced in the condensers, such "powder" will not travel far (in which I agree with him); but that, when formed elsewhere, it may be carried through long distances. Nevertheless he holds that friction is competent to rub some of it out of the gas, for friction admittedly reduces luminosity. It will only, however, accumulate where the speed of the gas is slow, to be wafted forward again in a stronger current. Also it naturally falls to the lowest parts, where it is liable to be washed into the drips by any deposited liquid. In the absence of the latter source of removal—*i.e.*, hydrocarbon liquid dissolving it—it is not apparent what eventually becomes of it. If it all finally goes to the burner, well and good. It matters little, after all, whether it gets there in the form of vapour or of powder; but I feel constrained respectfully to say that, so far as I know or can discover, as a proof of saturation the powder is not in evidence on a working scale.

The naphthalene of common experience is found in the crystallized form, and usually in greater quantity where the stream of gas is diverted by bends, tees, &c.—wherever, in short, the normal flow of the current is interrupted. Mr. Young states that, when in the condition of gaseous diffusion, naphthalene passes directly from the gaseous to the crystallized state; the crystals being deposited upon all surfaces having a temperature lower than the saturation-point of the gas. But the bends and tees in mains and service-pipes are not necessarily placed in more exposed positions than the straight pipes; and they must be assumed to vary equally with them in temperature. Why, then, do crystals appear in greater abundance at such spots? They are not wafted there like the powder; for, as Mr. Young says, they are "hard, coherent, and difficult to remove." I must respectfully insist that the heavier deposits of crystallized naphthalene at such places are not explained by considerations affecting saturation and condensation upon colder surfaces. Temperature must be assumed to be identical with that of the straight pipes. The deposits, therefore, should be of equal thickness; but the observed fact is that, as a rule, they are thicker.

Rotherhithe Gas-Works, Sept. 21, 1896. A. F. Browne.

Mr. Damon and the Evans Photometer.

Sir,—The Evans photometer has had a warm advocate in Mr. Sugg; and, after all, it is but natural that the maker of the instrument should defend it. But events all prove that this form of photometer is unreliable, and is destined to give way entirely in favour of an instrument of the open bar pattern. This is clearly shown from the following facts:—

1.—That the Evans photometer no longer exists in the Metropolitan official testing-stations, excepting in the altered form known as the Ladbroke Grove pattern.

2.—That one by one they are being removed from the official testing-stations by the instructions of the Referees—gentlemen who Mr. Sugg admits are, from the nature of their appointments, impartial.

3.—That gas engineers themselves recognize the difficulty in obtaining concordant results with them, and personally request their being replaced by more reliable instruments. Notably is this the case in the official testing-stations under the South Metropolitan Gas Company, in not one of which is there an Evans photometer.

Last, and by no means least, is the fact that one of the greatest experts in photometric apparatus, Mr. William Sugg, has demonstrated in a most practical manner his want of confidence in the old form of Evans photometer (which strange to say he is doing his best to defend and bolster up) by altering its very essential features—a movable standard and a fixed disc—and substituting a fixed standard and a movable disc. Also by the adoption of an improved system of ventilation—whether on the Ladbroke Grove principle or not is immaterial—to both the gas and candles, as well as to the photometer in general; thus producing an instrument which he calls a first-class Evans photometer.

It only remains to thank you, Sir, for publishing the discussion, and Mr. Sugg for his criticism.

123, *Ladbroke Grove, W., Sept.* 26, 1896. Alfred F. Damon, Gas Examiner to the London County Council.

[This correspondence is now closed.—Ed. J. G. L.]

The Self-Enrichment of Coal Gas.

Sir,—In the "Register of Patents" in the "Journal" for the 15th inst., there is one, on page 504, for "Enriching Coal Gas," registered by Mr. R. G. Shadbolt, of Grantham, and Mr. J. W. Broadhead, of Elland (No. 5051, March 6, 1896), which "relates to a method of enriching coal gas during its manufacture by the aid of its own products." I am very much surprised to see this method patented, because it has been used by me at the Ormskirk Gas Company's works since Oct. 26, 1892, and because the fact of its being in use here was told by me to one of the gentlemen named above when on a visit to these works on Sept. 12, 1895.

Ormskirk, Sept. 22, 1896. John Martin.

Gas Cookers and Coin Meters.

Sir,—In common with most gas-works, I have gone in last year pretty largely for these articles, and have spent nearly £1500 upon them. Being under a Corporation, the gas accounts have to go before the Finance Committee of the borough; and this body has come to the conclusion that all this expenditure ought to be borne by the present year's gas consumers. Such a course will turn my profit into a loss for the year, besides being (as I take it) manifestly unfair. The excuse appears to be that there is no other fund available, as the Local Government Board have given no leave to include the expenditure in any loan—in fact, they have never been asked to do so. It seems to me a very important point, as obviously my best course for another year is to do without these things.

I should be very glad to hear if this difficulty has arisen elsewhere; and if any reasonable way has been found of meeting it.

Sept. 24, 1896. A Corporation Gas Manager.

Water-Works for Ellesmere.—The Local Government Board have sanctioned the borrowing of £4000 by the Ellesmere District Council for the carrying out of a water scheme, which has been designed by Mr. Stooke, of Shrewsbury.

The New Well of the Leamington Corporation.—With reference to the application of the Leamington Corporation for power to borrow £2500 for works of water supply, the Local Government Board have informed them that they are not prepared to give a decision until it has been definitely ascertained that a supply of water, satisfactory both as regards quantity and quality, is likely to be obtained from the proposed new well. They are, however, willing to authorize the borrowing for a short period of the sum required to defray the cost of sinking a trial boring at the site of the proposed well; and if the result should prove satisfactory, the Board will be prepared to favourably consider an application for their sanction to the re-borrowing for an extended period of so much of the loan as might then be properly outstanding.

LEGAL INTELLIGENCE.

The Patent in "Automatic" Gas-Retorts.

In the Chancery Division of the High Court of Justice last Wednesday, before Mr. Justice Cave, Mr. Hopkinson, Q.C., on behalf of the Automatic Coal-Gas Retort Company, Limited, applied for an injunction to restrain the Corporation of Nelson from infringing, in the works they are now carrying out, the Company's patent for the construction of inclined gas-retorts. He said the patent was dated 1885, and it had never been in any way impeached. Certain actions had been taken by the plaintiffs upon the patent; and in every instance but one injunctions had been granted restraining infringement—the exception being the Corporation of Salford. Plaintiffs did not wish to stop the works of the Corporation (which are in the hands of Messrs. Little and Graham, Limited, of Smethwick); and he suggested that the matter should stand over until after the trial of the action against the Salford Corporation had been disposed of—the defendants in the meantime allowing inspection of the plans. Mr. Bousfield, Q.C., said his clients had always been ready to give inspection. He had no objection to the motion standing over till the trial. His Lordship said it was no use spending money on a case which might never come to trial, as it was most likely the action against the Salford Corporation would dispose of this one. He ordered the motion to stand over.

Alleged Embezzlement by a Collector.

At the Lambeth Police Court, last Wednesday, before Mr. Hopkins, William Wilson Irving, 38, described as a gas collector, of Sidmouth Grove, Peckham, was charged with embezzling money belonging to his employers, the South Metropolitan Gas Company. Mr. Passmore, solicitor, prosecuted. George Braidwood Allen, a clerk in the service of the Company, said the accused was a collector in their employ, at a salary of 37s. per week; his duty being to collect money placed by consumers in automatic meters, and to account for what he so received. So far as witness had been able to ascertain, Irving had failed to account for sums amounting in the aggregate to £32. John Underwood, another official of the Company, stated that, acting upon instructions, he followed the prisoner on his rounds on the previous Saturday and Monday, and obtained from some consumers the unofficial receipts produced, which they said Irving had given them. On the previous afternoon he called upon the prisoner, and asked him why he had not attended at the office that day. He replied: "To tell you the truth, I am ashamed, and cannot face them." Witness took him to the Company's office, and subsequently gave him into custody. A constable stated that the accused told him he had intended to go to the station before some one was sent after him. His Worship directed a remand.

Dealing in Stokers' Gloves Alleged to be Stolen.

At the North London Police Court last Tuesday, before Mr. Paul Taylor, William Wilkes, a greengrocer, of Wallis Road, Hackney Wick, was charged on remand with feloniously receiving a large number of gas stokers' leather gloves, the property of the West Ham Gas Company and other gas companies, well knowing them to have been stolen. Mr. Stephen Lynch again appeared for the prosecution; Mr. C. V. Young defended. The evidence already given, as reported in previous issues of the "JOURNAL," showed that the prisoner had for some time been dealing in the gloves. His account was that they were supplied to stokers at the rate of one pair per man per month, and that the men frequently made one pair last two months. The gloves thus saved the men regarded as perquisites, and sold to him at 8d. per pair. The prisoner was proved to have sold the gloves to Messrs. Berger, of Homerton, at 1s. a pair. When the case was adjourned last week, Mr. Lynch remarked upon the difficulty the prosecution had experienced in getting evidence against the prisoner. The Magistrate then said he thought those persons who ought to have been in the dock with the accused should show their gratitude for not being prosecuted by giving the necessary information. He now expressed the hope that the prosecution had obtained the information desired. Mr. Lynch said he was afraid they had not. After calling two more witnesses, however, he should ask for the committal of the prisoner. Detective Lee then gave evidence in corroboration of that already given by Detective-sergeant Kemp. Mr. Eustace Large, a member of the firm of Messrs. Farrance and Large, glove manufacturers, of Watling Street, said his firm supplied the West Ham Gas Company with stokers' gloves up to February last. He identified several pairs as those which his firm had sold to the Company. Addressing the Magistrate for the defence, Mr. Young said his client had been carrying on his dealings in these gloves for a long time; and the trade in them had been going on for at least thirty years. He should be in a position to show that the surplus gloves from The Gaslight and Coke, Commercial, and West Ham Companies were all disposed of in this way. It was a curious thing, if the Companies did not sanction the practice, that no regulation or notice had ever been framed directing the men to return the gloves at the end of a month. Shovels, on the other hand, were always returned. Mr. Taylor said this seemed to be the crucial point of the case. Was it a transfer of property or a transfer of possession only? Mr. Lynch said his friend's argument might be a good one but for the fact that most of the gloves found at the defendant's premises were neither stamped nor separated. This showed that they had never legally left the stores. Mr. Young: But there is no evidence to show where these gloves did come from. Mr. Lynch: He says he bought them of a fireman at the West Ham works, and he will not tell us his name. Mr. Taylor remarked that there appeared to be good grounds for a defence. He should, however, commit the prisoner to the Old Bailey for trial. Bail was allowed.

MISCELLANEOUS NEWS.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The Half-Yearly Report and Accounts.

In the report to be presented by the Directors of the above Company to the proprietors at their half-yearly meeting to-morrow, they refer to the Bill promoted by the Corporation of Dublin last session, which contained clauses injuriously affecting the Company's interests. Evidence in support of the clauses was submitted to a Committee of the House of Lords on the 10th, 11th, and 12th of June, whereupon the Committee, without calling upon the Company to produce a single witness, or hearing Counsel on their part, decided "that it was not expedient to proceed with the gas clauses of the Bill." In protecting the shareholders' interests, an expenditure of £3364 was incurred in parliamentary costs; and these are included in the revenue account. The gross receipts in the six months ending June 30 amounted to £125,754; and the expenditure, including interest on the loan capital, &c., to £98,946—leaving a net profit of £26,808. To this sum has been added £5229 brought from last account; making the total sum available for division £32,037. The Directors recommend the declaration of the usual dividends at the rate of 10½ and 7½ per cent. per annum on the respective shares, to pay which it will be necessary to take £1530 from the reserve fund; leaving a balance of £45,860 to the credit of that fund. Compared with the corresponding period of 1895, there is a diminution of £5516 in the rental for gas, arising from the reduction in price which took effect from the beginning of the year. There is also a reduction in the income from residuals amounting to £2911, caused by the depressed state of the markets for coke and sulphate of ammonia. With regard to working, there were 53,279 tons of coal and 10,340 tons of cannel carbonized in the half year; the make of gas being 642,131,000 cubic feet, of which 586,780,000 cubic feet were accounted for. The manufacturing operations resulted in the production of the following estimated quantities of residuals: Coke, 76,604 chaldrons; breeze, 6511 chaldrons; tar, 589,488 gallons; ammoniacal liquor, 1,289,989 gallons.

SHREWSBURY GAS COMPANY.

The Ordinary General Meeting of this Company was held last Wednesday—Mr. J. SPENCER PHILLIPS in the chair.

The SECRETARY and MANAGER (Mr. W. Belton) having read the notice convening the meeting, the report of the Directors was taken as read. In the course thereof, it was stated that the available balance of profit amounted to £2676; and the Directors recommended that the authorized dividend should be declared. This (after deducting the interim dividend paid in March last) would absorb £2428, and leave £248 to carry forward. There was a decrease of 2·63 per cent. in the consumption of gas during the twelve months ending June 30, owing to the very mild winter following the severe frosts of the previous year. The gas unaccounted for was 5·8 per cent. The Directors expressed regret that the Company had again suffered from the continued depression in the value of residuals, from which the returns were £430 less than before—a drop of about 10½ per cent. The mains had been extended for the better supply of certain districts; and new showrooms for fittings and stoves had been opened.

The CHAIRMAN, in moving the adoption of the report, emphasized the fact of the Company being in a position to supply fittings and everything requisite for lighting and heating; nineteen-twentieths of the consumers being, he said, totally ignorant that this was their business. Complaints were made about defective lighting; and, on inquiry, it was found that the fitting work had not been done by the Company's men, but by others who had not had special training for it. Having dwelt at some length upon the advantages of gas for both lighting and cooking, especially when employed for the first-named purpose in conjunction with the incandescent system, he proceeded to explain the principal items in the accounts. The capital account had, he said, been increased by £500, part of the cost of the new mains; and he complimented Mr. Belton upon the very careful way in which this work had been planned and supervised. The quantity of coal carbonized was 13,133 tons—a diminution of 645 tons on the bulk dealt with in the preceding year. This was owing partly to a somewhat reduced consumption of gas; but a good deal of it was attributable to the improved working of the furnaces, by which a saving of 2 per cent. in the amount of coal, or equivalent to 6d. per ton on the price, had been effected. Whereas they used 645 tons, or 4·68 per cent., less coal, the gas made was only 2·93 per cent. less, and the sale 2·63 per cent. less. In other words, they had made 4 million cubic feet less, and sold 3½ millions less—the difference being in the unaccounted-for gas, which was lower than this time last year. Turning to the revenue account, the total sales of gas amounted to £19,573. This was a diminution of £2109 on the amount received last year. Of this sum, £1600 represented the gift to the public by charging 3d. per 1000 cubic feet less; and the remainder was owing to the smaller quantity used, which was caused by the very mild winter in comparison with the very severe one of last year. The decrease was in the first three months; for the rest of the year there was an increase. The item of residual products, he regretted to say, showed a drop of £430, of which £296 was in respect of coke; while on sulphate of ammonia there was a decrease of £220, on top of one of £488 in 1895. This was entirely due to the difference in price. They received through the past year £7 15s. per ton; in 1895, £9 15s. per ton; and in 1894, £13 15s. per ton. At the time their plant was built, sulphate was worth nearly £20 per ton. They had decided to discontinue manufacturing sulphate, and to make liquid ammonia instead. They had entered into an advantageous contract, which would at all times ensure better prices than they could obtain from sulphate. Looking at the total receipts, there was a diminution of £2484, or 9·46 per cent., on the previous year. They had, however, lowered the expenditure by £1983, or 9·475 per cent.; so that the deficit was entirely covered. The profit and loss account showed a decrease of £345; so

that it left £248 to be carried over, as compared with £593 in 1895. The reserve fund was full. Turning to the general balance-sheet, notwithstanding they had given to the public £1600 in the lower price of gas, received £430 less for residuals, and written another £1000 off the suspense account, they had made within £500 of what was required for all purposes of dividend and other expenses. The difference was made up by carrying a reduced balance forward, and by using the interest on the reserve fund, as they had a right to do. This was shortly their position. He might add that everything on the works was kept in the highest state of efficiency. He thought it was impossible for the Company to be in a better condition, both at the present time, and, as far as could be judged, in the future.

The DEPUTY-CHAIRMAN (Mr. W. Beacall) seconded the motion; and it was carried unanimously.

A dividend at the rate of 7½ per cent. per annum (deducting the interim dividend) was then declared; and the proceedings closed with votes of thanks to the Chairman and Directors, as well as to the Manager and staff, for their attention to the affairs of the Company.

COLONIAL GAS UNDERTAKINGS.

In recent issues of the "JOURNAL," we have recorded the progress of two Colonial gas undertakings—the Perth (Western Australia) Gas Company and the Australian Gas Company. The reports of other Companies have lately come to hand; and they may be conveniently noticed together.

The Auckland Gas Company had a balance of £19,483 on Dec. 31 last. In the six months ending in June the receipts for gas amounted to £18,371; and those for residuals, to £3394—the total revenue being £41,392. The expenditure for raw material was £5555; and for the maintenance of works, £2354—the total expenses being £13,205. The balance of net profits was therefore £28,187. Of this sum the Directors proposed to use £8561 in the payment of dividends of 7s. 6d. and 3s. 9d. per share, and of 15 per cent. on a call, and to carry £19,636 to the profit and loss account. This proposition was agreed to at the half-yearly general meeting of shareholders, on which occasion the Chairman (Mr. T. Peacock) gave a few particulars as to the progress of the undertaking in the past seven years. At the beginning of that period, the annual output of gas was, he said, about 98½ million cubic feet, as compared with 139 millions now—an increase of 43 per cent. The number of accounts seven years ago was 4282, as against 6036 at present—an increase of 41 per cent. The achievement of selling gas, not only in the city of Auckland, but throughout the suburbs of Onehunga and Devonport, at 5s. per 1000 cubic feet, placed the Company in the front rank among gas companies. This would be realized when he stated that the price at which gas could be obtained by the smallest consumer in Auckland was only 3½d. per 1000 cubic feet more than the lowest price charged for gas in Melbourne, and only 6d. more than the price in Sydney, notwithstanding the much larger business. As to New Zealand, the price of gas in other towns might be placed at from 25 to 100 per cent. higher than it was in Auckland. These facts showed the strong position the Company had attained. Coming to recent figures, the past half-year's output of gas showed an increase of 27½ per cent. over the corresponding period of 1895; while the number of consumers of gas had risen during the twelvemonth from 5267 to 6036, or 14 per cent. The estimation in which the undertaking was held, from an investment point of view, was shown by the premiums now paid for the shares. This was not to be wondered at when it was remembered that the Company had paid regular dividends since 1867. The premium on the shares was higher than on those of any other gas company in the Australasian colonies, although the Sydney Company's shares, until the last few months, held a slightly higher place. The shareholders testified their appreciation of the labours of the Directors in placing the undertaking in this satisfactory position by increasing their honorarium from £310 to £450 per annum.

In the half year ending June 30, the Brisbane Gas Company had a net sum (including the balance brought forward) of £8147 standing to the credit of the profit and loss account. The Directors recommended a dividend of 4½ per cent., amounting to £6295. The dividend-tax upon this (£315) made up a total of £6610; leaving £1537 to be carried forward.

In the six months ending June 30 last, the Launceston (Tasmania) Gas Company had a decrease of 4½ per cent. in the sales of gas by meter, in comparison with the corresponding period of last year; but there was a net increase of 71 in the number of meters in use. The demand for heating-stoves and gas-fires has increased satisfactorily; and as special inducements are being offered to consumers desirous of purchasing cooking apparatus, it is expected that this branch of the Company's business will continue steadily to improve. The amount standing to the credit of the profit and loss account at the close of the half year was £3862; and the Directors recommended a dividend of 4½ per cent. for the year. The amount of coal carbonized in the six months, under the supervision of Mr. T. S. Cleminshaw, the Company's Engineer, was 2011 tons 7 cwt. of Newcastle, and 64 tons 5 cwt. 2 qrs. of shale; and the quantity of gas manufactured was 22,118,000 cubic feet, or 10,656 cubic feet per ton—the average illuminating power being 18·89 candles. The lighting of the public lamps by gas has been discontinued.

The Maryborough (Queensland) Gas Company, Limited, is a small undertaking, the profit realized by which in the six months ending June 30 was £959. A dividend for this period at the rate of 6 per cent. per annum, amounting to £765, has been declared; leaving a balance of £194.

In their report for the half year ending June 30, the Directors of the Rockhampton (Queensland) Gas Company, Limited, state that the consumption of gas, while being considerably less than that of the preceding six months, is practically the same as in the corresponding period of 1895. The demand for coke and tar continues large; and the stocks up to the end of the half year covered by the report were fully absorbed. The operations in the gas portion of the Company's business show a profit of £1695. Adding the amount brought forward (£183), there is a credit balance of £1878. The Directors state that the working expenses of the electrical department were somewhat less than in the preceding half year, while the returns were rather larger. The whole of the profit (£279) was employed in the payment of the interest on the debentures, amounting to £300; leaving a deficiency of £21 on this section of the Company's business. The land, buildings, plant, and fittings on rental and in stock in connection with the electric light scheme stand for about £16,000 in assets; and a sum of £434 was taken from the reserve fund (kept up out of the gas profits) for the maintenance and improvement of the plant last half year, as compared with £203 expended on the gas plant. The balance to the credit of the profit and loss account for the whole of the Company's business was £1857; and from this the Directors recommended the payment of dividends at the rates of 7 and 9 per cent. per annum, amounting to £1668, free of duty—leaving £189 to be carried forward.

The South Australian Gas Company realized £76,639 by the sale of gas, residual products, &c., in the year ending June 30. They spent for coals, £32,176; on maintenance, £2786; and for salaries and wages, £4049—the total expenditure being £42,210. There was consequently a balance of £34,429 to go to the profit and loss account. In November last, further reductions were made in the prices charged for gas in the city and suburbs, and at Port Adelaide and Glenelg. Nevertheless, by the increased sale of gas, the receipts for the past year were only £78 less than those for the preceding year, while the profits were increased by the reduced price of coal. The Directors have decided that, from the next meter readings, reductions shall be made in the prices of gas supplied from the Port Adelaide, Glenelg, and country works. The lighting at the intersections of some of the principal streets has been greatly improved by clusters of incandescent gas-burners in the public lamps; and the superiority of this method of illumination has induced a number of consumers to use similar burners.

MILTON-NEXT-SITTINGBOURNE GAS SUPPLY.

The Managership of the Works.

At the Meeting of the Milton-next-Sittingbourne District Council last Tuesday the question of the appointment of a Manager for the gas-works—a position which was advertised in the "JOURNAL" a few weeks ago—was brought forward. No fewer than 64 applications had been received in answer to the advertisement; and of this number four candidates had been selected by the Gas Committee for the consideration of the Council. These had been requested to attend the meeting; and the Committee recommended that they should be allowed third-class fare. The Committee further recommended that an extra stoker should be taken on at the gas-works, and that the men should be employed in eight-hour shifts; also that the stokers who were off duty should be utilized in lighting and extinguishing the lamps. The Committee suggested that the wages of the stokers should be 28s. per week. The Surveyor announced that one of the selected candidates had withdrawn, and that this reduced the number to three, who were in attendance. Before considering the applications, Mr. Littlewood, the Chairman of the Gas Committee, asked that the agreement between the Council and the former Manager (Mr. T. Pike) should be read. This having been done, Mr. Littlewood said he hoped there was one thing the Council would not do this time, and that was allow a fortnight's holiday every year. In answer to questions by this gentleman, it transpired that the new Manager's salary would be £100 a year inclusive, and that all the extras, in the shape of house rent, gas, and coals, were to be excluded from the agreement. After some remarks, the applications of the three candidates were considered, and the parties interviewed by Mr. Littlewood. When one of them came before the Council, he said the terms offered were a little less than he was now receiving, without the house, gas, or firing; and therefore he should not entertain them. Of the two remaining candidates, one was appointed by a majority of one; but, on being called in and informed of his "good fortune," he said he was not willing to accept the situation unless a house was included. Then came a few remarks, as to the terms of the advertisement; and the candidate was informed that, if he would not take the post on the conditions specified, he need not stop any longer. He accordingly retired. As the result of a consultation, the Council cast their eyes in the direction of the remaining candidate, who was ushered into the room and asked if he understood that the salary was £2 a week. He replied that he could not take the position without a house, coal, and gas. Mr. Littlewood thereupon warmly charged him with coming before the Council under false pretences. He then retired; and the Council were as far off their new manager as ever. Subsequently the Surveyor informed the Council that all the three candidates asked for their expenses. After some warm discussion, it was decided not to allow them as the candidates did not carry out the terms of the advertisement. On this being communicated to them, they expressed, through the Surveyor, their intention of taking the matter into Court. There was a meeting last Saturday, when a fresh candidate was seen.

Gas v. Oil for Public Lighting.—Those authorities who are thinking of lighting their districts by oil may peruse with advantage the following extract from the report of the Erith Lighting Committee: "With respect to the lighting by gas of the fountain lamp at Belvedere, the Committee find that previous to March, 1891, there was an oil-lamp at the place in question; but, owing to the nuisance created by the oil finding its way into the fountain, and also having regard to the danger of accidents when the light was out, the present arrangement was entered into. As the objections would still apply to an oil-lamp, under all the circumstances, the Committee do not recommend any alteration of the present arrangement for lighting the lamp with gas." Our local correspondent writes in regard to the foregoing recommendation "Though the Erith District Council still continue oil lighting for the streets, the same cause for not using oil at the fountain lamp applies to the whole of the public lamps, for they leak in a great many cases, and in others the smell from the smoke emitted is unbearable, and would not be tolerated if the offenders were private firms."

COMMERCIAL GAS COMPANY.

The Half-Yearly Report and Accounts.

The following is the report of the Directors of this Company for the half year ending June 30, which, with the accounts for this period, will be presented at the meeting of the proprietors next Thursday:—

The Directors submit the accounts for the half year ended June 30, 1896. The revenue account shows a net profit for the half year of £43,249 16s. 1d.; making, with £342 16s. 1d. received for interest, £43,592 12s. 2d. This, added to the amount brought forward from the previous half year, makes £58,708 0s. 5d. Deducting therefrom £3712 10s. for interest on debenture stock, there remains standing to the credit of the net revenue account a balance of £54,995 10s. 5d. available for dividend. The Directors recommend that dividends be declared at the rates of 13½ per cent. per annum upon the old stock of the Company, and of 10½ per cent. per annum upon the new stock, both less income-tax; and that the difference between the declared dividends and the authorized amount divisible, having regard to the price charged for gas, be carried to the reserve fund. The balance of the net revenue will be carried forward to the next half-year's accounts.

The accounts accompanying the report consist of the usual statements. The statement of capital stock (No. 1) stands as before—viz., £715,000 paid up, out of a total £830,000 authorized. The statement of loan capital (No. 2) is also unchanged—£165,000 borrowed, out of £300,000 authorized. The capital account (No. 3) shows receipts to the amount of £880,000; but a total of £877,951 10s. 9d. had been spent up to Dec. 31 last, increased to £891,594 0s. 5d. by the expenditure of £13,642 9s. 8d. (of which £3300 was for buildings, plant, &c., £1476 10s. for mains and services, £2088 10s. 10d. for meters and stoves, and £6548 18s. 1d. for "coin" meters and fittings) in the six months covered by the report. The capital account has therefore been overdrawn to the extent of £11,594 0s. 5d. The remaining statements in the accounts are reproduced in full. Appended to them is a note by the Official Auditor (Mr. Spencer W. Gore) to the effect that forfeitures of £3 5s. for defective illuminating power, paid in January last, must be deducted from the divisible profits.

No. 4.—REVENUE ACCOUNT.

To Manufacture of gas—				By Sale of gas—		
Coals, including dues, carriage, unloading, and trimming (see account No. 8)	£64,577 15 9			Common gas, per meter, at 2s. 6d. per 1000 cubic feet	£123,451 9 6	
Salaries of Engineer and Officers at works	2,177 18 4			Public lighting and under contracts, common gas. (See statement No. 10.)	9,584 7 5	
Wages (carbonizing)	19,646 1 3					£133,035 16 11
Purification, including £2017 16s. 8d. for labour.	4,139 15 7			Rental—		
Repair and maintenance of works and plant, materials and labour (less £291 13s. 5d. received for old materials)	16,020 4 2			Meters	£2,152 0 0	
		£106,561 10 1		Stoves	1,006 9 7	
Distribution of gas—				Coin meters and fittings	728 1 8	
Salaries and wages of Officers (including Rental Clerks)	£1,466 17 6					3,886 11 3
Repairs, maintenance, and renewal of mains and service-pipes, including labour	2,323 13 2			Residual products—		
Repair and renewal of meters	1,252 0 0			Coke, less £3974 4s. 0d. for labour	£20,325 17 3	
" " stoves	1,429 5 6			Breeze, less £867 8s. 9d. for do.	441 19 3	
" coin meters and fittings	682 12 8			Tar	8,415 2 7	
		7,154 8 10		Ammoniacal liquor and sulphate of ammonia	6,273 4 11	
Public lamps—Lighting and repairing		2,376 1 4				35,456 4 0
Rents, rates, and taxes		7,143 3 0		Miscellaneous receipts—		
Management—				Rents receivable	£325 13 7	
Directors' allowance	£1,250 0 0			Transfer fees	23 2 6	
Company's Auditors	75 0 0					348 16 1
Salaries of Secretary, Accountant, and Clerks	1,133 2 4					
Collectors' salaries and commission	1,429 18 11					
Coin Meter Collection	99 2 8					
Stationery and printing	543 17 7					
General charges	547 2 4					
		5,078 3 5				
Bad debts		801 8 11				
Law charges		17 1 4				
Superannuation		250 0 0				
Official Officers		95 15 3				
		£129,477 12 2				
Balance carried to net revenue account (No. 5)		43,249 16 1				
		£172,727 8 3				£172,727 8 3

No. 5.—PROFIT AND LOSS (NET REVENUE ACCOUNT).

Interest on debenture stock	£3,712 10 0	Balance, Dec. 31, 1895	£61,796 13 3
Balance available for dividend, carried to balance-sheet	54,995 10 5	Less—Amount of dividend paid for half year ending Dec. 31, 1895, £45,787 10s., and amount carried to Reserve Fund, £893 15s.	46,681 5 0
			£15,115 8 3
		Balance from No. 4 account	43,249 16 1
		Dividends and interest balance	342 16 1
	£58,708 0 5		£58,708 0 5

No. 6.—RESERVE FUND.

Balance on June 30, 1896	£41,589 14 6	Balance on Dec. 31, 1895	£40,695 19 6
		Net Revenue Account (No. 5)	893 15 0
	£41,589 14 6		£41,589 14 6

No. 7.—INSURANCE FUND.

Balance on June 30, 1896	£28,652 7 7	Balance on Dec. 31, 1895	£28,652 7 7
	£28,652 7 7		£28,652 7 7

No. 8.—STATEMENT OF COALS.

Description of Coal.	In Store, Dec. 31, 1895.	Received during the Half Year.	Carbonized during the Half Year.	Used during the Half Year.	In Store, June 30, 1896.
	Tons.	Tons.	Tons.	Tons. Cwt.	Tons. Cwt.
Common	29,331	117,715½	110,741	360 17	35,944 13
Cannel	4,244	11,157½	2,091½*	—	13,310 0
	33,575	128,873	112,832½	360 17	49,254 13

* 68,739 gallons of petroleum spirit used as a substitute for cannel.

No. 9.—STATEMENT OF RESIDUAL PRODUCTS.

	In Store, Dec. 31, 1895.	Made during the Half Year.	Used during the Half Year.	Sold during the Half Year.	In Store, June 30, 1896.
Coke—tons	11,029	68,240	19,626	52,152	7,491
Breeze—chaldrons	3,460	10,597	—	11,797	2,260
Tar—gallons	314,730	1,119,714	—	1,150,114	284,330
Ammon. liq.—butts of 108 gals.	14,868	41,134	44,977	—	11,025
Sulphate of ammonia—tons	1,601	1,394	—	830	2,165

No. 10.—STATEMENT OF GAS MADE, SOLD, ETC.

Description of Gas.	Quantity Made. Meter Register.	Quantity Sold. Public Lights and under Contracts (estimated).	Quantity Sold. Private Lights (per Meter).	Quantity Sold. Total Quantity Sold.	Quantity used on Works, &c.	Total Quantity accounted for.	Quantity not accounted for.	Number of Public Lights.
	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	Thousands.	
Common	1,135,624	60,445	987,612	1,048,057	15,300	1,063,957	71,667	5,514

BALANCE-SHEET.

Net Revenue—		By Capital—Balance, per account No. 3	£11,594 0 5
For balance, per account No. 5	£54,995 10 5	Cash at Bankers	4,227 0 6
Reserve Fund—		Cash in hand	2,200 0 0
For balance, per account No. 6	41,589 14 6	Amount invested in Consols	66,667 2 1
Insurance Fund—		Stores in hand—	
For balance, per account No. 7	28,652 7 7	Coals	£35,669 13 2
Dividends outstanding	2,190 7 10	Coke and breeze	4,215 5 6
Deposits	10,114 15 11	Tar, ammoniacal liquor, and sulphate	23,178 15 5
Interest on debenture stock	223 15 0	Sundry stores	11,386 16 5
Sundry tradesmen and others, for amount due for coals, stores, and sundries	13,430 12 0		74,450 10 6
Loan from bankers	68,000 0 0	Accounts due to the Company—	
		Gas and meter rental, quarter ending June 30, 1896	£49,042 13 9
		Arrears outstanding	502 12 11
			49,545 6 8
		For coke and other residual products	£4,618 1 6
		Sundries	895 1 7
			5,513 3 1
	£214,197 3 3		£214,197 3 3

THE ASSESSMENT OF THE LANCASTER GAS-WORKS.

At last Wednesday's Meeting of the Lancaster Town Council, the Gas Committee reported that the Town Clerk had received from the Clerk to the Lancaster Union an extract from the valuation list, wherein it appeared that the gas-works and mains of the Corporation in Lancaster were rated on a gross rental of £6857, and on a rateable value of £5714, and that the gas-mains in Scotforth, Skerton, and Bulk were assessed at rateable values of £42, £11 10s., and £38 respectively. The Town Clerk had been instructed to give notice of appeal against the respective assessments; and the Council were recommended to retain the services of Mr. Thomas Newbigging on behalf of the Corporation.

Mr. HELME, in moving the confirmation of the Committee's minutes said in the assessment the Overseers had now made upon the gas-works and mains, the rateable value adopted had been £5714 as against £3167, the sum at which it had stood during the last few years. This was such a large increase that the Committee asked permission to retain the services of Mr. Newbigging, who acted for the Corporation on a previous occasion when the Overseers proposed to increase the assessment by a large amount. At that time the assessment was successfully contested; and though now the works were somewhat altered from what they were then, the Committee were of opinion that an increase of £2500 on an assessment of £3167 should not be allowed without careful consideration.

Mr. BOWNESS seconded the motion.

Alderman SMITH inquired whether the Committee had considered what they would lose in expenses by contesting the assessment. It seemed to him that it was simply taking money out of one pocket and putting it into the other. The larger the assessment in the borough, the lower the rate in the pound.

Mr. HELME said this view of the matter had been considered by the Committee; but dealing with the question as affecting a department, they thought in fairness to the position of the undertaking they were bound to oppose an assessment they believed to be exorbitant, and have it put upon equitable lines. On the previous occasion, a very substantial reduction was made in the annual charge upon the undertaking.

Alderman TOWERS considered it of the highest importance that no department should be rated at more than was fair. They might say that it made no difference in the end, as what came out of one pocket was put into the other; but the mischief was that sometimes a lot was abstracted before it reached that other pocket.

Alderman BELL said when the Gas Committee appealed against the assessment a few years ago, though he believed there was a reduction, some of them thought it was money thrown away. He could not see where the benefit came in, because if the assessment was reduced, it simply meant that they would have higher poor and district rates, which might benefit the Committee to the extent of enabling them to show a bigger profit, but would not be of any advantage to the town. This assessment was made by Messrs. Myres, Veevers, and Myres, of Preston, who had no interest in the matter at all. The Electric Light Committee had had their assessment put up by two-thirds, but he did not think they proposed to contest it.

Mr. HELME replied that, as a Committee, they were charged with the oversight of a trading concern, which ought not to pay double the rates of anybody else.

The minutes were confirmed.

ELECTRIC LIGHTING NOTES.

The report of the Brush Electrical Engineering Company, Limited, for the year ending June 30 has been issued. In it the Directors state that the profit and loss account shows a gross profit of £33,736. After deducting general charges, maintenance of buildings, plant, and patents, staff bonuses under the Company's profit-sharing scheme, bank interest, and interest on first and second debenture stock, there remains a net balance of profit of £4615 for the year. The Directors express regret that the profits are not larger. The result is attributable partly to a general falling off in the volume of central station electricity supply contracts, and partly to the prevalence of unduly low prices for electrical machinery. The Directors anticipate, however, that the future demand for electric traction plant will fully compensate for the shrinkage of orders for electric lighting machinery; while with regard to prices, they are glad to state that there are some indications of improvement. Meanwhile, every effort has been made to minimize general and administrative charges, as shown by the substantial reduction of nearly £4000 which has been effected during the year. The Directors anticipate still further reductions during the current twelve months. In the past year, the Directors accepted an offer from one of the large Continental manufacturing firms for the purchase of their Vienna factory. The amount realized fully reimburses the Company for its capital outlay on the business. The sum resulting from the transaction was upon a cash basis, and appears under the items relating to cash in the balance-sheet. In deference to the wish expressed by shareholders at recent annual general meetings, and in view of the disposal during the year of the Company's Vienna factory, the Directors consider the present a convenient opportunity for subdividing the capital item of property, patents, and goodwill, which has hitherto appeared as a single item in the balance-sheets. With this object, they have obtained a full report from Messrs. Fuller, Horsey, Sons, and Cassell, whose valuation of the Company's freehold works, together with the fixed plant, machinery, loose tools, and utensils at Loughborough, amounts to £83,847; and of the leasehold factories at Lambeth and Southwark, to £5000—together, £88,847. Deducting this sum from the amount of £295,244, representing the aggregate value of the undivided items of property, patents, and goodwill, as per the balance-sheet, a balance of £206,397 is represented by patents and goodwill. While many valuable patents owned by the Company are still included in this item, the early patents in connection with electric lighting, for which large sums were originally paid by the Company, have now mostly expired. In order to deal effectively with the position thus arising, the Directors strongly recommend the shareholders to write off £1 per share from the nominal value of the ordinary shares of the Company. This will produce a figure of £90,000, which it is proposed to apply during the current year in reduction of the item of patents and goodwill, and in eliminating from the books such of the items included in the suspense account appearing in the balance-sheet as may prove to be valuless. The Directors have placed to this suspense account all assets standing in the books of the Company which they consider to be in any way doubtful; and the step now recommended, upon receiving the sanction of the shareholders, will ensure that profits of future years shall not be hampered by the uncertainty attaching to the doubtful assets referred to. Subject to this recommendation being adopted, the Directors propose to pay to the preference shareholders the balance of dividend due to them from last year, amounting to £2141, and to carry forward the balance of £1653 which remains after clearing off the debit of £820 brought forward. In accordance with the shareholders' approval at the last annual general meeting of the decision to create an issue of £105,000 of 4½ per cent. redeemable second debenture stock, £76,770 of such stock was allotted in the autumn of last year. During the year under review, the Company have sub-leased the Lambeth factory for the remainder of its term, and have transferred the final remnant of the London manufacturing operations to Loughborough, where the whole of the Company's manufacturing is now concentrated. An important contract has been secured from the British Electric Traction Company for the equipment of the North Staffordshire Tramways system with electric traction. The Directors consider that there is every indication that electric traction will be largely adopted in this country in the immediate future; and they look upon the position of the Company in respect to undertaking works of this character as exceptionally favourable, having regard to their command of ample working capital, and to the fact of their being manufacturers of rolling-stock and tramway material as well as of electrical plant. The contracts with the County of London and Brush Provincial Electric Lighting Company for the equipment of electricity supply stations in St. Luke's, Middlesex, and the Wandsworth district have been in progress during the past year; and it is expected that a supply of current will be available in both areas during the coming winter. The contract with the Government of Malta for the establishment of an electricity supply station for the lighting of Valetta and of the Government establishments, is now practically completed; and the Directors say the result has given general satisfaction. Orders are in course of execution for central electricity supply stations, factories, mining works, &c. The Company are introducing a type of alternating current dynamo, new to this country, for which they hold important patent rights.

The Limerick Corporation have been pressed by a few persons to undertake the supply of the electric light; but, very wisely, they have determined not to venture into the business until they are satisfied that they will receive sufficient support. That they are justified in their resolve is clearly shown by some figures furnished to the members, at their meeting last Tuesday, by Mr. W. Spillane, the Manager of the gas-works. He had communicated with 306 consumers of gas in order to ascertain whether they would take the electric light; the result being that only 37 answered in the affirmative, 28 had not made up their minds, and 35 did not want it, while the remaining 206 simply ignored the inquiry. The smallest installation, it was computed, would cost £14,000. With such a poor showing in favour of an installation, Mr. Spillane addressed a letter to the Board of Trade, requesting that—in view of a recent letter from that body with regard to the electric lighting of the city, and stating that there was nothing in the law to prevent private firms putting down installations and supplying their neighbours—the Corporation should not be forced to put into operation the Provisional Order obtained in 1892. The present gas-works, he pointed out, were the property of the citizens; and the debt thereon would be cleared off in three years, pending which the Corporation desired that no outside company should be allowed in the city. To this the Board replied that they were not prepared to definitely revoke the Order till 1899, but that, in the circumstances referred to by Mr. Spillane, they would postpone consideration of the question for the present. It was added, however, that, should no steps be taken by the Corporation within a reasonable period to give effect to the provisions of the Order, and should an application for powers be made by a company who could show that a substantial demand for the supply of electrical energy existed, it would then be necessary for the Board to consider whether that application should not be granted and the Corporation Order revoked.

The Electricity Committee of the St. Pancras Vestry have reported upon a recent failure of the public lighting in the Hampstead Road, part of Camden Town, and the Camden Road. The breakdown seems to have been due to the faulty condition of certain of the cables, which resulted in fusion, and consequently interrupted a number of circuits northward. The Chief Electrical Engineer has considered the question of coupling the lamps to the low-tension supply as a temporary means of maintaining the lighting, in the event of accidents, and he estimates the cost at about £270. He has also recommended further alterations, which the Committee will report later. It was stated at the last Vestry meeting that the Committee would shortly have to ask for the necessary funds to overhaul and re-arrange the mains. After a lengthy discussion, it was decided for the present to refer back for further consideration the proposals for temporary measures.

When the Hampstead Vestry met last Thursday after the summer vacation, the Electric Light Committee reported that their Assistant Electrical Engineer had resigned, and that they had advertised for a successor at the same salary—£2 5s. weekly. That this official should have voluntarily deprived himself of such a munificent income shocked Mr. Richardson, who said the Vestry's Electric Lighting Department was simply becoming "a dumping-ground for people to come and learn their business," and then seek for better appointments. The obvious remedy for this state of things did not occur to the Vestry;

nor is this surprising, considering that the Finance Committee reported on the same *agenda* that, while the Vestry's general pass-book showed a credit balance of £13,924, upon the electric lighting pass-book there was a debit balance of £10,750. In order to effect economy at the central station, it was decided to spend £100 for altering the four existing boilers there, so as to adapt them for hand stoking with Welsh coal, in lieu of the present system of mechanical stoking with Derbyshire coal, in accordance with the suggestion of the Engineer, who has been making experiments. The private lighting is gradually increasing, for the Committee report that the number of applicants for current is now 450, of whom 417 are connected, with an equivalent of 31,602 8-candle lamps, as compared with 385 applications and 355 connected, with 25,292 lamps, on June 25 last.

The opposition to the introduction of the electric light into Colchester by the Corporation of that town is of a very determined character; and it is quite on the cards the Local Government Board will decline to sanction an undertaking which the Corporation have already commenced to carry out. The memorial against the scheme which has been presented to the Board contains 1530 signatures—a large number for a town the size of Colchester.

The Board of Trade have granted a Licence to Earl De La Warr and Mr. R. Kersey for the electric lighting of Bexhill; the Licence to cover a period of two years. If the undertakers make default in laying down any cables, in accordance with the provisions of the Licence, within the period prescribed, they are to be liable to a penalty not exceeding £5 in respect of each default for every day it continues; and if the Board of Trade are of opinion that such default is wilful or unreasonably prolonged, they may revoke the Licence either wholly or partially, or impose new conditions.

SHEFFIELD CORPORATION WATER DEPARTMENT.

Mr. Eaton's Position and Emoluments.

A great outcry has been raised in Sheffield over the proposals of the Corporation Water Committee with regard to the suggested elevation of Mr. E. M. Eaton to the position of Consulting Engineer, and the fees which will attach to the office (*ante* pp. 511, 561). In order to emphasize their protests against what they term the "unwarrantable proposals" of the Water Committee, and "the persistent action of the City Council in granting salaries to the already highly paid officials," the opponents convened a mass meeting of the ratepayers for Wednesday last. The attendance was large; and, throughout, the meeting was obviously in thorough sympathy with the object the promoters had in view.

Mr. C. Hobson, a member of the Council, presided; and in his opening speech, he gave some statistics showing the increases in the salaries paid in the various Corporation departments since 1888. In that year, in the Water Department, the salaries amounted to £6277; while now they were £7587. He asserted that the composition of the Council was a guarantee of high salaries and low wages. Speaking of the proposed resignation of Mr. Eaton, and his appointment as a Consulting Engineer, he said that Mr. Eaton had enjoyed a berth at £1200 a year, and yet the work was now to be done practically by the man who had been receiving £600, and who it was suggested should now have £800. It was ungenerous, if not an act of ingratitude, for Mr. Eaton to resign his office of Engineer immediately he saw that his experience (which experience he had gained in the service of the Sheffield Corporation, and for which he had been well paid) would be of value to the Corporation. It was not, he maintained, unfair criticism to say that Mr. Eaton's resignation was due to the fact that the works at Langsett were to be constructed; and his object in commencing business now was that he might secure the Sheffield Corporation as his client, which would ensure him a successful business career; and all this because he believed he had made himself necessary to the Corporation. They seriously objected to that part of the compact which limited Mr. Eaton's services to an average of one or two days a week. If the work was so important, and a single error might involve the city in a disaster by which thousands of lives might be lost and millions of pounds lost in property, then they should require the whole time and services of the man who was made responsible for the work. At the last meeting of the Council, they were told that the commission would realize £3000 a year; and they could reasonably expect that Mr. Eaton would not give more time to the work than was specified. On this basis, Mr. Eaton was to be paid at the rate of £9000 a year; and as the Langsett reservoir was one of a series of reservoirs, they could reasonably conclude that such an arrangement as the one suggested would continue indefinitely, which meant a life work at £3000 a year. They would be told that professional etiquette would require that whoever did the work should be paid by commission, and that 5 per cent., not 4 per cent. was the acknowledged rate. If that was so, let them bow to the inevitable. Put professional men into competition, pay the best price, and get the best man. They wanted all the time, talent, and attention of the engineer.

Mr. Stuart Uttley moved a resolution protesting against repeated increases in the salaries of Corporation officials, and expressing strong disapproval of the proposal of the Water Committee to pay a high commission to the Chief Engineer for minimum services. He stated that he was never more surprised in his life than when he learned that, at this critical juncture, Mr. Eaton had decided to sever his connection with the water undertaking. He thought if the Chairman of the Water Committee (Alderman Gainsford) was the employer of a man who, when important matters were on hand, said he was going to give up his situation, he would begin to lose his confidence in that man.

Mr. W. F. Wardley, in seconding the resolution, alleged that there were two things which had to be fought on the City Council—professionalism and freemasonry.

Other gentlemen having addressed the meeting,

Alderman Gainsford, at the outset of a long speech, said he might say, on behalf of the Water Committee, that the whole of the question that had been discussed would be thoroughly reconsidered by them. He complained that when, as Chairman of the Committee, he asked the Council to put through a Bill proposing to spend £900,000, not a single word was said; but directly they came to talk of salaries, which did not affect a tithe of the interest on that sum, there was a great outcry. They wanted more attention to big subjects, and not quite so much agitation in regard to little ones. Mr. Hobson was not altogether correct when he compared Mr. Eaton's salary of £1200 with what he said would be his £3000 a year in future under the proposed arrangement. The £1200 was a net figure, and the £3000 which was proposed was a gross figure, from which perhaps even as much as one-half would have to be deducted for expenses. He was the only Chairman of a Committee who had never appeared before the Council with a proposal to draw from the rates. During the nine years he had been Chairman of the Water Committee, they had shown an advancing prosperity, and an increasing fund to the credit of the ratepayers, besides which they had given a constant supply, without diminution or stoppage, except for accidents in isolated places, during the whole of that period. It was as long ago as April last that Mr. Eaton communicated to him his wishes to start in practice on his own account. He gave him as his reason various lucrative pieces of work outside Sheffield which were at his disposal. He (Alderman Gainsford) then did two things. He consulted the other members of the Committee, and the leaders of the engineering profession in London; and they all agreed that the proper course to take was that the man who had thought out and evolved the scheme was the proper man to have the carrying of it into execution. With regard to his statement, in reply to a question in the Council, that the amount of money upon which commission would be paid during the next five years would be £400,000, this sum was stated without previous calculation; and he had since found that the amount to be spent in the period named would be £351,000. He closed his speech by remarking that, whether he continued to be the Chairman of the Water Committee or not, it would be a disappointment to him, after taking such a part in the passing of the Act, not to be able to carry out in the same position some, at any rate, of the initial stages of those works, and to see the great Langsett reservoir finished and full of water.

The resolution was carried unanimously.

BIRKENHEAD CORPORATION WATER SUPPLY.

Proposed Extensive Purchase of Water-Works.

The Water Committee of the Birkenhead Town Council have drawn up a report on the question of acquiring the undertakings of the Wirral and West Cheshire Water Company. The Committee, after referring to previous negotiations for the purchase of a portion of the property, state, with regard to the present water supply of the borough, that from the Corporation wells at Spring Hill, Flaybrick Hill, and Borough Road, the supply of water actually pumped for the week ending Sept. 21, 1895, was 20,234,000 gallons, though, had the wells been pumped to their full extent, the yield was 29,000,000 gallons. An additional weekly supply of 6,500,000 gallons might be available if the wells were deepened and improved. Regarding the question of the Corporation having a sufficient supply if the townships of Oxton and Rock Ferry were included, the total estimated demand for all the townships would be 24 million gallons; and there would remain a surplus supply from the three Corporation wells of 5 million gallons per week if the wells were pumped to their full extent. With this information before them, the Committee proceeded to negotiate with the Wirral Water Company, with a view to acquiring the rights of water supply in Oxton and Rock Ferry, together with the mains and pipes laid in these townships; but, in the end, the advisers of the Company came to the conclusion that this purchase only would deprive the Company of the most lucrative and best paying part of their district, and would leave them with a reduced income, and such liabilities and permanent expenses that scarcely any sum in reason would compensate for the loss of the district. Under these circumstances, the Company declined to sell, except at an absolutely prohibitory price, but intimated they were willing to dispose of the whole concern. Negotiations were then continued with this end in view; the result being that a price has been fixed for the property, which, in the opinion of the Committee, is both fair and reasonable. The Wirral Water Company have an authorized capital of £50,000 in 5000 £10 shares, all of which are issued and fully paid up. The district of supply includes Oxton, Rock Ferry, Bebington, and other places not within the borough. The West Cheshire Water Company have a capital of £80,000 in 8000 £10 shares, of which 4000 shares only have been issued, all of which are fully paid. Shortly after their incorporation, the latter acquired the undertaking of the Wirral Company, and from that time the two concerns have been managed as one undertaking, although separate accounts have been kept. The properties include two wells at Prenton, yielding 7 million gallons weekly, a well at Hooton yielding 2½ million gallons weekly, and the various pumps, machinery, mains, &c. The two undertakings have a debenture debt of £120,000, the interest on which averages 3¾ per cent. The accounts for the year 1894 show a gross income of £11,142, and working expenses amounting to £3438; leaving a net income of £7704. After many proposals, the Companies have expressed their willingness to dispose of the whole of the Wirral and West Cheshire properties, for £260,000; the Corporation taking over the obligations of the Company in regard to the debentures already issued, amounting to £120,000, some of which are not repayable until 1910. It is estimated that, if the proposals are carried through, there would be an annual interest of £5037 to be met if repayment of the loan was extended over 50 years, or £8287 if repayment was required over 30 years; and to meet this, a water-rate would have to be levied in the borough. Having regard to the desirability of the Corporation becoming the water authority throughout the whole of the borough, the Committee strongly recommend that the property should be acquired on the terms named.

The report of which the above is an epitome came before the Town Council last Friday. Its adoption was moved by Alderman Bloor, who thought that the scheme was financially a very fair one, and that the undertakings would, if acquired, ultimately yield a handsome profit. The subsequent discussion was mainly antagonistic to the proposal of

the Committee. Mr. Thompson considered the great monetary responsibility the Council were asked to take on their shoulders was not to be compensated for by the benefits to be derived. Mr. Crosbie Oates observed that they were invited by the Committee to purchase a concern which had the greatest difficulty to supply its customers at present; and if the Corporation acquired the property they would have to provide an additional supply before long for the district they were proposing to take over. They were asked to pay £260,000 for a concern supplying 7 million gallons of water a week, whereas their own works cost them £221,000, and produced 28 million gallons of water a week. Three or four other members also spoke in opposition. Alderman Rawcliffe considered the most important point in the discussion was as to the definite assurance that they would have an ample supply of water; and if they were satisfied of this, they should by all means support the Committee. Alderman Lees was of the same opinion; while Alderman Deakin (who had formally seconded the motion) pointed out that what they were negotiating for was a dividend-paying concern. Their wells were sinking; and it would be necessary before long to look for an increased supply from somewhere, and the present was a good opportunity to secure the means of doing so. Alderman Bloor, in reply, said there was no immediate fear of a water famine; but the Committee considered it expedient to provide for eventualities. On a vote being taken, the resolution to purchase was lost by 38 votes to 6.

THE SLEAFORD DISTRICT COUNCIL AND THE WATER SUPPLY.

A Meeting of Ratepayers Ratify the Purchase of the Works.

The governing body and ratepayers of Sleaford have for some months past been considering the question of purchasing the water-works. In June, the District Council, through their Clerk (Mr. E. Clements), inquired of the Company whether, with the view of saving expense, they would consent to the sale of the undertaking by arbitration; but the reply of the Directors was an intimation that they would offer strenuous opposition to any application the Council might make for parliamentary powers. This, however, has not deterred the Council from proceeding; and they have held the usual public meeting of the ratepayers to obtain their consent to the promotion of a Bill to empower them to purchase. The adoption of the resolution giving the necessary consent was moved by Mr. G. R. Lee; but his address as reported in the local press, was entirely barren of solid facts or figures upon which a sound judgment could be based. Mr. W. H. Spite seconded the motion; and his speech was very little better. He, however, gave a few hypothetical figures as to the outcome of the purchase. For ease of calculation, he took as a basis 23½ years' purchase, which, he said, would work out to £12,000—just double the capital. If the Council could borrow the money for sixty years at 3 per cent., the annual charge would be £433 12s. 6d. from an income of £510—leaving a balance of £76 7s. 6d. to the good of the town. Mr. Jackson pointed to the price that the Company's shares now command, and expressed his opinion that it would cost £18,000 to buy the property, besides between £2000 and £3000 in parliamentary expenses. Another member of the Council—Mr. W. C. Bates—spoke; but still there was nothing definite for the guidance of the ratepayers. Mr. R. Creswick appealed for statistics; but they were not forthcoming. The sum mentioned by Mr. Spite was regarded by Mr. Hubbard as misleading; and he declared his belief that the total cost would be £20,000. It was mentioned that the average dividend of the Company since it started had been 6 per cent. Mr. Creswick made a point when he said that, if any member of the Council would guarantee that the cost would not be more than the figures quoted, he would back them up; the guarded reply given by Mr. Lee being that they were advised by Counsel that the transfer would be on the basis of 16 or 18 years' purchase. The motion was carried by 83 votes to 61; but a poll was demanded.

Additional Plant for the Smethwick Gas Undertaking.—The Gas Committee of the Smethwick District Council have decided to instruct the Clerk to make application to the Local Government Board for sanction to a loan of £1500 to cover the cost of new purifying-shed, carburettor, and prepayment meters.

The Charge for Water for Trade Purposes at Hastings.—Having regard to the fact that the expenditure in connection with the water supply of Hastings has of late years necessarily been heavy, and that at the present charges for water a large deficiency on the working account results, the Town Council, on the recommendation of the Water Committee, have decided to give notice to all persons at present supplied with water, either from the wells or the surface reservoirs by meter, for trade purposes, at the ordinary rate of 1s. per 1000 gallons for any excess quantity used, that at the expiration of the current half year the charge for such excess will be 1s. 6d. per 1000 gallons, and that this charge will be in future made in all ordinary cases. It is stated that the water costs the Corporation 1s. 6d. to supply.

Leeds Gas-Works Profits.—The City Accountant of Leeds (Mr. Derry) has presented a report to the Gas Committee with regard to the revenue of the gas-works for the year ending March 25 last. From this it appears that the gross profits amounted to £37,861; and after paying £11,367 into the sinking fund account, there was a surplus of £26,494. During the year, there was a decrease in the income from the sale of residuals amounting in the aggregate to £10,073—the falling off in the receipts from coke being £1096; tar, £226; ammoniacal liquor, £8745; and carbon, £6. Meter-rents were abolished on July 1, 1894; so that for the first time the full effect of this measure was seen in the past year—the sum received as meter-rents having been £11,000. At the beginning of this year—three months before the close of the financial year—the price of gas was reduced 2d. per 1000 cubic feet. Taking into consideration the great decrease in the revenue from residuals, the abolition of meter-rents, and the reduction in the price of gas, the Committee consider that the profits were very satisfactory. From the surplus £18,000 has been transferred to the borough fund in relief of the rates.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Emperor and Empress of Russia arrived safely at Balmoral on Tuesday evening. In this fact there is nothing of interest for the readers of the "JOURNAL"; but there was an incident in connection with the arrangements for the reception of the Emperor at Ballater which necessitates the mention of the subject here. This was the behaviour of a boorish knot of Socialists in the Aberdeen Town Council. It is necessary to pass Aberdeen on the way to Balmoral; and, as other Corporations were doing, through whose jurisdictions the Emperor was to pass, the Aberdeen Town Council resolved to present an address of welcome to him. The Council met on Monday for ordinary business. Before taking this up, however, Dr. Beveridge, moved to suspend the Standing Orders, so that he might move to instruct the Magistrates that, while making every fitting arrangement for the safety of the Emperor, they do not spend the public money on any adulatory address or reception. A more unseemly suggestion was scarcely ever made. Still there were seven members of the Council who supported it. Nineteen opposed; and the Standing Orders were not suspended. This led to the tabling of a dissent by Dr. Beveridge, with the intimation that he would, at the next meeting, lodge his reasons for so doing. The Lord Provost ruled that there was nothing to dissent from; the Council not having taken any action. At a later stage of the proceedings, the Gas Committee reported that they had received an application from the General Manager of the Great North of Scotland Railway Company for the use of an engine and dynamo, with which to illuminate their station at Ballater on the night of the Emperor's arrival; and that they had, with one dissentient, agreed to hire to the Railway Company a 40-horse power engine and dynamo at the rate of £5 per day, from the time of removal till the plant should be again fitted up in the works in Aberdeen. This step was objected to by two members of the Council. Mr. Johnston, the Convener of the Committee, supported the action they had taken, on the ground that it was a business transaction. The objection to the Committee's decision was based on the technical plea that they should not have acted without the sanction of the Council; and it was maintained that it was "utterly immoral and utterly corrupt and wrong" to say that the Council should give their plant for any purpose if they were well paid, and that the plant was to be put to "an utterly wrong and improper use by the Railway Company." The objectors divided the Council on the subject, and brought out that there were only two of them. The action of the Committee was therefore homologated. Now this is not the place to discuss politics; but it will not be inopportune to point out to electors everywhere the folly of electing to office such men as the originators of this municipal disturbance. The Emperor came from Copenhagen; and, naturally, he should have landed at Aberdeen. As a matter of fact, the Princess of Wales, from the same port, did so two days later; but the Czar landed at Leith. For this, there must have been a reason. Not even an Emperor would undertake an unnecessary railway journey of 100 miles without cause. I have seen it suggested that the reason was to be found in the fact that Aberdeen is honeycombed with Socialism. Well, this being the assumption, the result was that the trading public of Aberdeen lost the profits they would have made upon the necessarily large public outlays in preparing for the reception, and upon the private outlays of those who desired to witness the proceedings. To go further, Aberdeen, as the nearest town to the Royal residence, receives a large amount of Royal patronage in the course of the year. Had the Town Council passed the resolutions which were proposed, they might have been the means of alienating this patronage, to the great loss of the citizens. This, to be sure, is regarding the matter from a material point of view; but after all, humanity, whatever its principles, cannot afford to quarrel with its bread and butter.

The Forfar Gas Corporation are quiet at present. They had a meeting on Monday, at which the only business was the report on the output of gas during the past month. This showed that 2,101,000 cubic feet were sent out, as compared with 1,904,000 cubic feet in the corresponding month of last year. I hope this is the beginning of good times for the Corporation, who have, during the past two years, passed through some unusual experiences.

A new complexion has been put upon the existing position of the negotiations between the Stirling Town Council and the Stirling Gas-light Company for the transfer of the Company's undertaking to the Corporation. Last week I mentioned that, in response to a resolution adopted at a public meeting of ratepayers, to the effect that the Town Council should consult the ratepayers before coming to terms with the Company, it was given out in the Town Council that this would be done. This week the Secretary of the Company has written to the Town Clerk, pointing out that his Directors have all along understood that the negotiations were at this stage strictly private, and particularly, with reference to the report now being obtained from a gas engineer, that the document was to be entirely confidential, unless and until terms for sale were adjusted; and that, in view of the discussion in the Council, and of the fact that the initiative came from the Council, it seemed necessary to ask the Council to state whether the terms of the negotiations, as defined in minutes and correspondence, were still regarded by them as binding, or otherwise. The letter has been sent to the Gas Committee for consideration.

The Police Commissioners of Lockerbie continue to levy the gas contingent guarantee rate; the only instance of the kind I have ever known. It was reported at a meeting which they held this week, that the consumption of gas had so improved that it was now possible to reduce the rate from 5d. to 4d. per pound. There is a prospect of a further reduction, or probably an extinction of the rate, next year. The Commissioners imposed the rate to make up a deficit in the working of the gas undertaking, in preference to raising the price of gas, the effect of which would have been to diminish the consumption. That the Commissioners were right has been proved by the result.

On Monday night, the Police Commissioners of Saltcoats met to consider a proposal that they should acquire the undertaking of the Gas Company. Provost Smith moved that negotiations be entered into with the Company with a view to purchase. A directly counter motion was made; but it received no support, and the Provost's

resolution was adopted. A Committee were appointed to wait on the Directors of the Gas Company on the subject.

A writer in the Paris "Figaro," who has been in Edinburgh this week, comments favourably upon the lighting of the streets, as compared with some in Paris. This is turning the tables with a vengeance; for we have been accustomed to hear nothing but sneering remarks at the public lighting of the capital of Scotland. Those statements I never homologated, because I know cities which are worse lighted by gas than Edinburgh; but to enter further into this subject would be to raise the question of illuminating effect as distinguished from illuminating power. Unfortunately, we may say, in this instance the praise is given to the electric lighting, which the writer says is so brilliant that "one can read one's newspaper walking along." The opinion is that of a stranger, who has not got to pay for the light. If he had to do so, his admiration might be expected to be a little tempered. I observe this week that the lighting of the streets of Edinburgh by electricity—a very few of them be it remembered—is to cost the citizens ½d. per pound this year more than gas would. The increased cost on account of the electric lighting of less than one-twentieth of the streets of the city is about £4000. This amount, if spent on gas, would produce an effect which would have astonished the Parisian visitor; but the fact is that the authorities, while they are lavish with electricity, always grudged expenditure upon gas.

The outlook for the Scotch oil companies is better than it has been for a long time. Lubricating oil is rising in price; and there has been, of late, a distinct improvement in the demand for oil for gas making. Few, I believe, are aware of the extent of the oil-gas industry. It is practically only a few years old; and yet already, according to the evidence of Mr. G. T. Beilby, of Edinburgh, before the Select Committee on Petroleum, the output of gas oil of all the Scotch oil companies in 1895 was 154,897 barrels. Of burning oil, the output was 450,000 barrels; so that the demand for oil for gas making is a third of the business which is the primary object of the oil companies.

The Gas Committee of the Dundee Town Council are considering the propriety of promoting a Bill to confer upon them larger borrowing powers, and also authority to extend the electric lighting area. They have asked the heads of departments to draw up reports on the matter as to their requirements and the probable cost of them.

A flutter of excitement has been created in Dundee by the remarks of Colonel Sandeman, of Stanley, at a meeting of the Tay Fishery Board at Perth yesterday. The Colonel alleged that when the Dundee Water Act was passed 25 years ago, the Earl of Airlie sold to the Dundee Water Commission, for £36,000, the right to take water from Lintrathen which should pass down the Tay. The Water Commission undertook to give 15 cubic feet of water per second as compensation; but in 1891 they got a Bill passed which reduced the compensation to one-half. This he characterized as theft; and he cited a case which had been brought in England, in which, after 18 years, an Act reducing the amount of compensation was set aside, and the original terms were enforced. The want of the water, he asserted, was preventing fish getting up the river; and Dundee would have to pay them thousands of pounds as damages. He intends to take action in the matter before the County Council. If the Colonel be right, there would appear to be a bad period before the Dundee Town Council, who will, whether they have to pay damages or not, require to overhaul their water supply arrangements.

Councillor Osborne, who is Convener of the Water Committee of the Glasgow Town Council, and the oldest Councillor in the city, is not to seek re-election this year. He addressed his constituents in the Sixth Ward on Thursday night, and said that perhaps the severest wrench to his feelings in leaving the Town Council would be his severance of connection with the Water Trust. When he entered the Council 34 years ago, the number of inhabitants supplied with water was estimated at 470,000; while to-day the population supplied numbered over 900,000. The revenue of the Trust had also more than doubled itself. The revenue 34 years ago was £80,000; and the rates during the first two years he was a Councillor were ½d. within the city, and ½d. beyond the boundaries. The revenue now was £180,000. The consumption in the old times was at the rate of 41 gallons per head of the population; now it was 53 gallons per head. He was glad to say that increase did not mean waste; the necessary domestic supply to-day being very much what it was 34 years ago. The increased quantity was due to use for manufacturing purposes, and other domestic supply. The revenue had grown so rapidly, chiefly through use of water for other than domestic purposes, that they had been able to meet the whole outlay going on in the Water Trust without increasing the rates. From this source they had been able to make the new works now approaching completion. He considered it almost a feat in finance that they had been able to do so much without increasing the rates. When the new works were completed, they would have a supply of 60 gallons per head per day. When he entered the Town Council, there was little to do except manage a few odds and ends; and they never thought of calling a meeting monthly. Monthly meetings were only introduced when the Water Trust was established. The City Improvement Trust was formed two years later; and two years after that the Council took up the gas, and followed four years later with laying tramways. To be a town councillor then was really a pleasant pastime; but he had found that now the work was not only a labour of love, but a tax upon the town councillor.

The Airdrie and Coatbridge Water Company have this week issued £10,000 of stock for the purpose of completing their new water supply scheme, which has been in progress for the last two years. The present issue is in £10 shares, and is to bear not more than 5 per cent. dividend. It is to rank *pari passu* with the previously issued £5 shares, the dividend on which is limited to 10 per cent. The present issue was disposed of by auction. The shares were put up in lots of twenty, at a premium of 10 per cent.—viz., £11 each. Five lots were sold at £13 15s.; three at £13 17s. 6d.; twenty-six at £14; four at £14 1s.; two at £14 2s. 6d.; and one at £14 3s. 6d. The highest price at a previous sale of stock was £13 15s.

Another Water Bill for Eastbourne.—It is stated that the Eastbourne Town Council intend to take measures again with a view to the promotion of a Bill next session to empower them to acquire the undertaking of the Eastbourne Water Company.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST (see ante, p. 586).

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	15 Apl.	10½	Alliance & Dublin 10 p. c.	23—25	..	4 4 0
100,000	10	,,	7½	Do. 7 p. c.	18—19	..	3 18 11
300,000	100	1 July	5	Australian (Sydney) 5% Deb.	108—110	..	4 10 11
200,000	10	12 June	5	Belgrano (B. Ayres), Limited	10—10½	..	4 15 3
100,000	Stck.	26 June	5	Do. 5 p. c. Deb. Stk	100—103	..	4 17 1
200,000	5	29 May	6½	Bombay, Limited	7⅞—8¼	..	3 18 9
40,000	5	,,	6½	Do. New, £4 paid	5½—6	..	4 6 8
380,600	Stck.	13 Aug.	12	Brentford Consolidated	285—290	..	4 2 9
210,000	,,	,,	9	Do. New	215—220	..	4 1 9
50,000	,,	,,	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
159,375	,,	12 June	4	Do. 4 p. c. Deb. Stock.	130—134	..	2 19 9
220,000	Stck.	16 Sept.	11½	Brighton & Hove Original	242—247*	..	4 13 1
208,820	,,	,,	8½	Do. A Ord. Stk.	185—190*	..	4 9 5
933,500	Stck.	28 Aug.	5	Bristol, 5 p.c. max.	127—132	..	3 15 9
420,000	20	27 Mar.	11½	British	57½—58½	..	3 16 11
50,000	10	28 Aug.	11½	Bromley, Ordinary 10 p. c.	22—23	..	5 0 0
71,000	10	,,	8½	Do. 7 p. c.	19—20	..	4 5 0
500,000	10	29 Apl.	5	Buenos Ayres (New) Limited	10⅝—11½	..	4 8 11
200,000	100	1 July	6	Do. 6 p. c. Deb.	103—106	..	5 13 2
150,000	20	15 July	8½	Cagliari, Limited	29—31	..	5 6 5
100,000	10	29 May	6†	Cape Town & District, Ltd.	16¼—17½	+⅛	3 8 8
50,000	50	2 May	6	Do. 6 p. c. 1st Mort.	58—60	..	5 0 0
550,000	Stck.	15 Apl.	13½	Commercial Old Stock	345—350	..	3 17 2
165,000	,,	,,	10½	Do. New do.	260—265	..	3 19 3
165,000	,,	12 June	4½	Do. 4½ p. c. Deb. do.	152—157	..	2 17 3
800,000	Stck.	12 June	13	Continental Union, Limited.	287—292	..	4 9 0
200,000	,,	,,	10	Do. 7 p. c. Pref.	220—225	..	4 8 11
51,600	Stck.	28 Aug.	14	Croydon Com'cial A 10 p. c.	315—320	..	4 7 6
163,400	,,	,,	11	Do. B 7 p. c.	250—255	..	4 6 3
535,000	Stck.	28 Aug.	5½	Crystal Palace Ord. 5 p.c. Stk	140—143	..	3 13 5
60,000	,,	,,	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
486,090	10	15 July	11	European, Limited	26—27	−½	4 1 6
354,060	10	,,	11	Do. £7 10s. paid	18—19	..	4 6 11
5,746,590	Stck.	13 Aug.	12½	Gaslight & Coke, A, Ordinary	303—308	−2	4 2 9
100,000	,,	,,	4	Do. B, 4 p. c. max.	110—115	..	3 9 7
665,000	,,	,,	10	Do. C, D, & E, 10 p. c. Pf.	305—315	..	3 3 6
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	147—152	..	3 5 9
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	212—217	..	3 9 1
1,300,000	,,	,,	7	Do. H, 7 p. c. max.	207—212	..	3 6 0
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	305—315	..	3 3 6
476,000	,,	,,	6	Do K, 6 p. c. Prf.	173—178	..	3 7 5
1,061,150	,,	12 June	4	Do 4 p. c. Deb. Stk.	138—143	..	2 15 11
294,850	,,	,,	4½	Do. 4½ p. c. do.	153—158	..	2 16 11
908,000	,,	,,	6	Do. 6 p. c. do.	207—212	..	2 16 7
70,000	10	14 May	6	Hongkong & China, Limited	12—13	..	4 12 4
3,800,000	Stck.	14 May	12	Imperial Continental	247—252	−2	4 15 3
376,400	100	1 Aug.	4	Do. 4 p. c. Debs. Red.	100—103	..	3 17 8
473,600	Stck.	13 Aug.	3½	Do. 3½ p. c. Deb. Stk	108—110	..	3 3 8
75,000	5	26 June	6	Malta & Mediterranean, Ltd.	6—6½	..	4 12 4
560,000	100	1 Apl.	5	Met. of Melbourne, 5 p. c. Deb.	115—118	..	4 4 10
250,000	100	,,	4½	Do. 4½ p. c. Debs.	110—112	..	4 0 4
541,920	20	12 June	5	Monte Video, Limited	16½—17½	..	5 14 3
150,000	5	29 May	8	Oriental, Limited	8½—8¾	..	4 11 5
135,000	5	,,	8	Do. New, £4 10s. paid	7½—7¾	..	4 12 10
15,000	5	,,	8	Do. do. 1879, £1 paid	1⅞—2	..	4 0 0
60,000	5	16 Sept.	7	Ottoman, Limited	5—5⅛*	..	6 7 3
420,000	100	1 May	6	People's Gas } 1st Mtg. Bds.	105—110	..	5 9 1
500,000	100	1 June	6	of Chicago } 2nd Do.	102—107	..	5 12 1
250,000	10	27 Mar.	10†	San Paulo, Limited	13½—14½	..	6 18 0
5,475,000	Stck.	13 Aug.	5⅝	South Metrop., 4 p.c. Ord.	140—145	..	3 11 8
820,000	,,	15 July	5	Do. 5 p. c. Deb. Stk.	173—176	..	2 16 10
60,000	Stck.	16 Sept.	11½	Tottenham & Edmonton, A	260—270*	..	4 5 2
60,000	,,	,,	8½	Do. B	180—190*	..	4 9 5
170,380	10	29 May	10	Tuscan, Limited.	13½—14½	..	6 18 0
149,900	10	1 July	5	Do. 5 p. c. Debs. Red.	100—102	..	4 18 0
				WATER COMPANIES.			
746,123	Stck.	26 June	10½	Chelsea, Ordinary	345—350	..	2 18 7
150,000	,,	,,	5	Do. 5 p. c. Pref.	177—182	..	2 14 11
160,000	,,	,,	4½	Do. 4½ p. c. Pref. Stk., 1875	160—164	..	2 14 10
175,785	,,	27 Mar.	4½	Do. 4½ p. c. Deb. Stock	165—170	..	2 12 11
1,719,514	Stck.	15 Apl.	7	East London, Ordinary	232—237	−1	2 19 1
654,740	,,	26 June	4½	Do. 4½ p. c. Deb. Stk.	165—170	..	2 12 11
100,000	,,	,,	3	Do. 3 p. c. Deb. Stk.	105—107	..	2 16 1
700,000	50	12 June	7½	Grand Junction, 10 p.c. max.	120—124	−1	3 0 6
280,000	Stck.	27 Mar.	4	Do. 4 p. c. Deb. Stk.	152—157	..	2 10 11
708,000	Stck.	13 Aug.	12	Kent	347—352	..	3 8 3
160,000	,,	,,	7	Do. New, 7 p. c. max.	217—222	..	3 3 0
1,043,800	100	26 June	7½	Lambeth, 10 p. c. max.	265—270	−2	2 15 7
406,200	100	,,	7½	Do. 7½ p. c. max.	225—230	..	3 5 2
350,000	Stck.	27 Mar.	4	Do. 4 p. c. Deb. Stk.	152—157	..	2 10 11
500,000	100	13 Aug.	12⅛	New River, New Shares	433—438	..	2 18 11
1,000,000	Stck.	30 July	4	Do. 4 p. c. Deb. Stk.	155—158	−2	2 10 8
902,300	Stck.	12 June	4	S'thwk & V'xhall, Ordinary	154—159	−3	2 10 4
126,500	100	,,	4	Do. Do. 7½ p. c. Max.	150—155	..	2 11 7
489,200	Stck.	,,	5	Do. Do. 5 p. c. Pref.	175—180	..	2 15 6
1,019,585	,,	15 Apl.	4	Do. 4 p. c. A Deb. Stk.	153—156	..	2 11 3
1,155,066	Stck.	12 June	10	West Middlesex	328—333	..	3 0 0
200,000	,,	,,	4½	Do. 4½ p. c. Deb. Stk.	165—170	..	2 12 11

*Ex div.

† Next dividend will be at this rate.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Sept.* 26.

Sulphate of Ammonia.—The week has brought no relief from the depression which seems to have settled upon the market. There has been a fair amount of demand for immediate shipment; but supplies have been sufficient to meet it—production being on the increase, and makers showing a decided disposition to quit their output as ready. Closing quotations are £7 8s. 9d. Leith, £7 10s. Hull, and £7 11s. 3d. to £7 12s. 6d. Liverpool. In the forward position, buyers are indifferent; and only concessions in price will tempt them. There are sellers at a slight premium up to the end of the year; and under £8 has been accepted for January-June, 1897, f.o.b. Leith. It is also reported that the same months have been done at £7 15s. Beckton terms.

Nitrate of Soda remains quiet at 7s. 10½d. for ordinary, and 8s. for fine quality on spot. Cargoes afloat or for shipment are neglected. Those due are worth 7s. 7½d. to 7s. 9d. per cwt. Late autumn shipments are quoted 8s. 1¼d. to 8s. 3d. per cwt., without attracting any attention.

LONDON, *Sept.* 26.

Tar Products—Benzols are still slightly on the upper tack. Business has been done for prompt delivery at 4s. 9d.; and 4s. 7½d. is spoken of October-December, and 4s. 3d. January-June. Solvent naphtha is pretty firm; and further business has been reported at 1s. 6d. forward. There is but little life in pitch. It seems to hang fire. The buying time, however, is now upon us; and contracts for the season's delivery will almost immediately be wanted. Carbolic acid is more inquired for; and the price has improved a shade. Anthracene remains as before.

Values are as follows: Tar, 18s. 6d. to 26s. 6d. Pitch, 31s. Benzols, 90's, prompt, 4s. 9d.; forward, 4s. 3d.; 50's, prompt, 3s. 5d.; forward, 3s. 1½d. Toluol, 2s. 4d. Solvent naphtha, 1s. 6d. Crude, 30 per cent., naphtha, 1s. 5d. Creosote, 2d.; liquid, 2⅛d. Heavy oils, 4½s. 6d. Naphthalene, pressed, 60s.; salts, 32s. 6d. Cresylic acid, 10d. Carbolic acid, 60's, 1s. 9½d. Anthracene, "A," 10½d.; "B," 8½d.

Sulphate of Ammonia.—The market seems to go from bad to worse. As low as £7 5s. has been offered for sulphate for this week's delivery; and buyers do not seem keen even at this price. To-day's value is from £7 7s. 6d. to £7 12s. 6d., less 3⅛ per cent. discount.

COAL TRADE REPORTS.

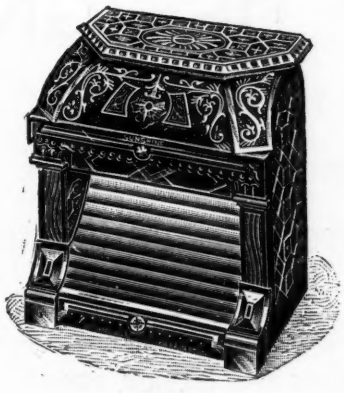
From Our Own Correspondents.

Lancashire Coal Trade.—In the coal trade here, the continued cold, wet weather brings forward some extra inquiry for house-fire qualities; but this is not of any great weight, and where pits are on full time stocks are increasing. Though there is less disposition to take the excessively low figures recently ruling, list rates are without appreciable change. At the pit mouth, best Wigan Arley is quoted at 10s. to 10s. 6d. per ton; and Pemberton four-feet and seconds Arley, at 8s. to 8s. 6d. Shipping business remains slow, with prices still cut extremely low to effect sales; and for delivery at Mersey ports or on the Manchester Ship Canal, 6s. 9d. to 7s. per ton are the average figures obtainable.

Northern Coal Trade.—There has been a very unequal movement of the coal trade the last few days in this district. A slight falling off in the demand has shown itself for steam coals; and the stormy weather has interfered with the arrival of steamers, so that the collieries have had less work in one or two cases. On the other hand, there has been an enlarged demand for nearly all classes of Durham coals, so that the tendency in the market has been to more general firmness for fuel. Gas coals are decidedly firmer. Not only is the large quantity locally used and sent to the South increasing week by week, but two of the large Durham collieries are now idle—one permanently and the other temporarily, through an inrush of water. Still, there is so far an abundant supply of gas coals; but the growth of deliveries lessens the amount for sale in occasional cargoes, and the price for best Durham gas coals must now be quoted as about 6s. 9d. per ton f.o.b. No contracts of moment seem now to be in the market. There is no alteration in the gas coke trade this week. The output is being increased; and in some of the inland works the sales rather lag behind, so that the stocks, though not heavy, are rather fuller. Prices are unchanged.

Scotch Coal Trade.—There is a large amount of business done; and the prospect, every way, is more reassuring. The agitation among the miners for higher wages still continues; but in view of the anticipated concession of a portion of their demand, it is not serious. In fact, the men are working very steadily, though advised by their leaders to restrict the output. The demand is improving; but as yet prices remain unaltered. The quotations are: Main, 6s. 3d. to 6s. 6d. per ton f.o.b. Glasgow; and ell, 6s. 9d. to 7s. The shipments for the week amounted to 169,891 tons—an increase over the quantity in the preceding week of 12,814 tons, and over the corresponding week of last year of 1226 tons. For the year to date, the total shipments have reached 5,548,016 tons—an increase over last year of 261,697 tons.

The Ledbury Water Supply "A Scandal."—Representations having been made to the Local Government Board as to the water supply of Ledbury, they appointed Colonel Coke to ascertain locally the actual facts, as well as the nature of the proposals of the Council for remedying the alleged deficiency. The Inspector visited the town last Saturday week, and met the members of the Council. He was informed of the number of schemes already considered and afterwards abandoned by the Council, and also by the old authority which was in existence previous to the passing of the Local Government Act. After hearing the various statements, Colonel Coke mentioned two of the schemes which commended themselves to him; and he advised the Council to settle at once on something definite, remarking that the present supply was a scandal. The supply from the reservoir is said to be limited to a quarter of an hour daily.



RICHMOND & CO., LTD.

WARRINGTON & LONDON.

THE "SUNSHINE."

SPLENDID VALUE.

FIRE-BRICK RADIATING TILE.

WELL FOR BOILING.

BEST VALUE IN THE TRADE.

	Height.		Depth.		Width.	
No. 545 .	14½	by	7	by	11½	12s. 6d.
No. 547 .	15	,,	8	,,	13½	15s. 0d.
No. 549 .	17	,,	10	,,	15½	21s. 0d.

The Glasgow Dynamitards.—In the "JOURNAL" last week, we stated that the man Kearney, who had been arrested at Rotterdam, would probably be brought to trial on the charge of being concerned with the dynamite explosion at the Tradeston Gas-Works, Glasgow, early in 1883. It is now authoritatively stated that offences of this nature are not included in the extradition treaty with the Netherlands; and that therefore the Government will not take further proceedings.

Presentation of Water-Works to Charlbury.—Mr. A. Albright, of Birmingham, has presented to his native place, Charlbury, water-works which have been constructed at a cost of about £1500, and capable of giving a supply of 1600 gallons of water per hour. In order to prevent the undertaking becoming a burden on the rates, a Company has been formed to manage it. The nominal capital amounts to £750, in £1 shares; but only 350 shares are at present allotted. It is provided that, after paying working and other expenses, and a dividend restricted to 5 per cent. per annum, the profits shall go in reduction of the scale of charges, which are now fixed at 6d. in the pound per annum.

The Drogheda Water-Works.—The report of the Directors of the Drogheda Water Company (which was adopted at the meeting of the shareholders last Tuesday week) stated that the rental from all sources showed an increase of £52. The balance to the credit of the revenue account amounted to £910, out of which the Directors proposed the payment of a dividend of 4½ per cent., free of income-tax. The Corporation, it was also mentioned, had succeeded in passing through Parliament an Improvement Bill which included powers for the compulsory purchase of the water-works on the basis of arbitration. Meantime the Directors promised to lose no opportunity of studying the case of the shareholders, so as to have it placed fairly before the Arbitrator.

Seville Water-Works Company, Limited.—Last Friday an extraordinary meeting of this Company was held, to consider a proposal of the Board to borrow an amount not exceeding in the aggregate £50,000 in addition to any sums already borrowed. The whole of this sum is not required for immediate expenditure; and the only present outlay to be made is for the water supply of the town of Alcala, which it is estimated will cost about £9000. This concession has been taken over because it was feared that, the springs which supply Alcala and Seville being so close together, there would be a liability of dispute, and also because the Alcala works, on their own merits, ought to pay a good dividend. The adoption of the necessary resolution was moved by the Chairman, Mr. David Evans, who stated that it was intended to raise the money by debentures. Mr. W. Blaber seconded the motion. Mr. Tufnell expressed himself as satisfied with the Directors' proposals; but Mr. Ernest Rüffer contended that, by voting an addition of £50,000 to the present debenture capital, thus raising it to £180,000, they were making the Company "top-heavy" in debentures. After some discussion, the Directors, on the suggestion of the last-named gentleman, gave an assurance that they would not spend more than £25,000 of the money without first consulting the shareholders; and thereupon the resolution was unanimously carried.

Strike of Gas Workers in Berlin.—According to a Reuter's telegram dated last Saturday, the men employed in the Municipal gas-works in the fifth quarter of Berlin went out on strike that day; being dissatisfied, it is alleged, with their hours of work, more especially the system of dividing the shifts.

Messrs. Sadler and Co., Limited.—The annual report of the Directors of this Company show that the profit realized for the past year amounts to £27,359. The Directors recommended a dividend of 4 per cent., which, after making allowance for depreciation, and placing £1500 to the credit of the reserve fund, still leaves between £5000 and £6000 to be carried forward.

Proposed Purchase of the Aldeburgh Gas and Water Works.—For some time past the Aldeburgh Town Council have been considering the question of purchasing the undertakings of the Aldeburgh Gas and Water Companies; and the matter has now assumed definite form. Both Companies have agreed to sell their properties; and, with their consent, the works are to be inspected by Mr. J. Mansergh.

New Water-Works for Masham.—The Masham District Council have completed water-works for the supply of the area under their jurisdiction. The station is at Golinlith Foot; and there a reservoir has been constructed, of a capacity of 30,000 gallons. The reservoir is fed by springs; and the available supply is said to be three times the quantity actually required. The distributing system extends to Healey, Fearby, Fearby Cross, and Masham. The Engineers were Messrs. Firbank and Sons, of Westminster; and the Contractor, Mr. T. Bell, of Market Weighton.

Torquay Gas Company.—At the half-yearly meeting of this Company last Wednesday, dividends were declared at the rate of 10 and 7 per cent. per annum. Mr. W. H. Kitson, J.P., who presided, said the accounts were fairly satisfactory, considering the condition of gas companies generally, which, owing to the weather and the fall in the price of residuals, had not been doing so well of late. Some companies had been obliged to dip deeply into their reserve funds; but the Torquay Company had not found this necessary. On the contrary, they were able to pay the usual dividends out of the past half year's earnings, and carry forward a small surplus. The actual profit had been £3374; and after taking £3291 for dividends, a balance of £82 remained. The receipts from the sale of gas showed a drop of £1200 when compared with the corresponding half of 1895. The difference was accounted for by a reduction of 8d. per 1000 cubic feet in the price, representing £760, and by a decrease in the quantity sold, representing £480. Nevertheless, shares sold during the half year had realized the highest price ever obtained. The Town Council had succeeded in getting sanction to borrow money for electric lighting; but it remained to be seen what course the Council and the town would adopt. He still had faith in the Gas Company. Experience went to prove that there was plenty of room for both lights side by side, and there was no cause for uneasiness. There were 50 penny-in-the-slot meters in use; and applications for them were still being received.

New Condensing Stoves.
Nos. 770 & 771.

GAS-FIRE SEASON 1896-97.

BEFORE ORDERING, SEE OUR

NEW DESIGNS.

UNEQUALLED,

UNAPPROACHED, AND

WITHOUT IMPERFECTION.

LISTS, ON APPLICATION, FROM

JOHN WRIGHT & CO.
LIMITED,

BIRMINGHAM & LONDON.

THE OLDEST AND LARGEST GAS-STOVE MAKERS IN THE WORLD.

The Manchester Corporation and Water Gas.—The Local Government Board have refused to sanction a loan for the construction of plant at the Manchester Corporation Gas-Works for the manufacture of water gas. They consider that the absence of statutory provisions governing the use of this illuminant renders it advisable that the necessary powers should be obtained by Act of Parliament.

The Assessment of the Lancaster Water-Works.—The Town Clerk has reported to the Lancaster Corporation Water Committee that he has received from the Clerk to the Lancaster Union an extract from the valuation list, from which it appears that the water works and mains of the Corporation in Lancaster were rated on a gross value of £5142, and on a rateable value of £4285, and that the water-mains in Skerton, Scotforth, Bulk, and Slyne-with-Hest were assessed at rateable values of £36, £287, £97, and £17 respectively. The Committee have referred the matter to the Town Clerk, the Borough Surveyor, and the Borough Accountant.

Awards at the Sanitary Congress Exhibition.—Among the awards made by the Judges at the Health Exhibition held in connection with the recent Sanitary Congress, we notice the following: A silver medal to the Davis Gas-Stove Company, Limited, for their enamelled "Metropolitan" gas kitchener. Bronze medals to the "Cannon" Hollow Ware Company, of Bilston, for the "Hercules" gas-cooker; to Messrs. Evered and Co., of London, for the "Eveflus" water-waste preventer; and to Messrs. Charles Wilson and Sons, of Leeds, for their "Canopy" gas-stoves. Among the exhibits selected for practical trial are the following: The "Eureka" lead-encased block-tin water-pipe of Messrs. R. Clarke and Co., of Heckmondwike; Judge's valve for preventing waste of water, shown by Messrs. Crozier, Stephens, and Co., of Newcastle-upon-Tyne; the differential gas-governor of Messrs. J. Defries and Sons; the Welsbach incandescent gas-light and fittings exhibited by Messrs. Emley and Sons, Limited, of Newcastle; and the Stott-Thorp reflex light and ventilating sun-burner and the Stott gas-governor of Messrs. J. Stott and Co., of Oldham and London.

Gas and Electric Lighting in the Manchester Out-Districts.—Attention was called at the meeting of the Gorton District Council last Thursday to the refusal of the Manchester Corporation to receive a deputation from the out-townships with regard to a reduction in the price of gas and the abolition of the charge for meters. In consequence of this, Mr. Shaw gave notice of a motion that the Council apply to the Local Government Board for power to supply electricity in the district, and that a Committee be appointed to take into consideration the advisability of supplying gas of their own manufacture or by some neighbouring authority. The Moss Side District Council were also discussing the question of electric lighting yesterday week. A favourable report was made by the Chairman (Mr. J. Nuttall) on a conference of representatives of the out-townships with the Electric Lighting Committee of the Manchester Corporation. Alderman Gibson informed the deputation that the Corporation would charge the out-districts exactly the same as they did their city customers—viz., 5 per cent. on the cost of the whole outlay in land, buildings, plant, and wages. It was decided to hold a special meeting of the District Council for the purpose of passing a formal resolution empowering them to apply to the Board of Trade for a Provisional Order. It was understood by one member that the Manchester Corporation offered to reimburse them for the expenses involved in obtaining the Order.

Sales of Shares.—The following shares were sold by auction at Ramsgate last Tuesday: Eighty £5 "A" shares, earning 10 per cent., in the Deal Water Company, realized £14 each; three similar shares being disposed of in one parcel for £42. Ten £10 "B" shares in the same Company, earning 7 per cent., were put up in pairs, and knocked down at £39 the pair; similar shares being bought at £38 per pair. Thirty-two 24s. "C" shares (5 per cent.) were sold in two lots, and realized £24 a lot; and three lots of 17 shares each went at £25 15s. a lot. On Wednesday, twenty ordinary shares in the Norwich Water Company made an average of £20 12s. 6d. apiece. On the same day, £490 of "A" shares in the Ipswich Gas Company realized an average of £30 2s. 6d. per £10 share for 160, and £30 each for the rest. The following prices were paid for shares in local Gas Companies at a sale at Wakefield last Friday: Original £25 shares in the Wakefield Gas Company were bought for £64; shares classed as £5 "B" 5 ths realized £9 17s. 6d.; £10 shares (£4 paid) produced £8 14s.; and fully-paid £10 shares changed hands at £18 18s. 6d. Original £5 shares in the Ossett Gas Company were sold for £12 10s. each. At Lytham, on Monday last week, Messrs. E. Wilson and Son offered for sale a number of lots of the Fylde Water Company's stock; and, in view of the proposed acquisition of the undertaking by the Local Authorities, a good deal of interest centred in the proceedings. The auctioneer first offered £747 of "B" stock, in lots of £100; and the average price realized was £225 10s. per lot. Another £300 of similar stock sold at the same figure per £100 lot, and £34 of 4 per cent. preference stock in the Company fetched £46 10s.

GWYNNE & BEALE'S

PATENT GAS EXHAUSTERS AND ENGINES.

Telegrams: "GWYNNEGRAM, LONDON." Telephone No. 65,095.

GWYNNE & CO.,

HYDRAULIC AND GAS ENGINEERS,

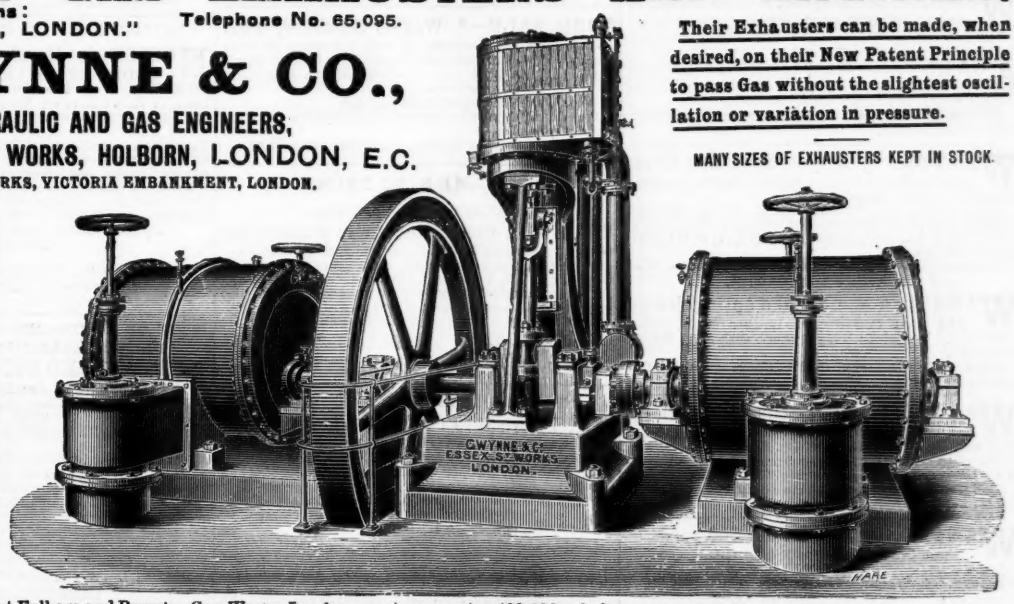
BROOKE STREET WORKS, HOLBORN, LONDON, E.C.

Late ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON.

They have completed Exhausters to the extent of 32,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, PATENT RETORT-LIDS, STEAM-PUMPS for Tar, Liquor, or Water; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.



Their Exhausters can be made, when desired, on their New Patent Principle to pass Gas without the slightest oscillation or variation in pressure.

MANY SIZES OF EXHAUSTERS KEPT IN STOCK.

Exhausting Machinery at Fulham and Bromley Gas-Works, London—each set passing 400,000 cub. ft. per hour drawing 14 miles distant from Beckton.

Catalogues and Testimonials sent on application.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.

JOHN WM. O'NEILL, Managing Director, Palmerston Buildings, Old Broad Street, London, E.C.

ANDREW STEPHENSON, AGENT. All communications re Oxide to be addressed to Palmerston Buildings.

WINKELMANN'S "VOLCANIC" CEMENT. Fire Resistance up to 4500° Fahr. in use in most Continental Gas-Works, and in more than 800 British Gas-Works.

ANDREW STEPHENSON, 182, GRESHAM HOUSE, OLD BROAD STREET, LONDON E.C.

Telegrams: "Volcanism, London."

J. & J. BRADDOCK, Globe Meter Works, Oldham.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Address: "Braddock Oldham."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.

Telegraphic Address: "PORTER LINCOLN."

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. Sample and Price on application.

OXIDE PAINTS, OILS, SULPHURIC ACID, &c.

120 and 121, NEWGATE STREET, LONDON, E.C.

Telegrams: "BOGORE, LONDON."

OXIDE OF IRON.

FINEST Quality of Natural Bog Ore. Particulars and price, apply to Mr. T. L. ARCHER, 20, Fennel Street, MANCHESTER.

SPENT OXIDE Wanted. J. HARDMAN, Milton, STAFFS.

SULPHURIC ACID for Sale (B. O. V. and R. O. V.) made from Spent Oxide. J. HARDMAN, Chemical Works, Milton, STAFFS.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS, should be received not later than the FIRST POST on SATURDAY.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND Co., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS TAR wanted.
BROTHERTON AND Co., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SPENT OXIDE wanted.
BROTHERTON AND Co., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHURIC ACID for Sale.
BROTHERTON AND Co., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of SULPHURIC ACID, from Brimstone, for Sulphate of Ammonia making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol. References given to Gas Companies.

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

ADVERTISER (age 21) desires Engagement in the Laboratory and Office of a Gas-Works. Address F. M. ATTWOOD, The Royal Naval Yard, DEPTFORD, S.E.

WANTED, Bricklayers, Retort Setters, and FURNACE BUILDERS.
Apply to JONAS DRAKE AND SON, Ovenden, HALIFAX.

A GAS-WORKS Manager can recommend a Youth as JUNIOR CLERK. Shorthand, Double Entry, and Gas-Works Accounts.
Address No. 2712, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Provincial Gas Company, a MANAGING CLERK, with a practical knowledge of Gas Manufacture, &c.
Applications (with Testimonials), stating Age and Salary required, to be forwarded not later than Oct. 1, addressed to No. 2706, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-WORKS MANAGER.

WANTED, a Man to take entire charge of a small Country Gas-Works. Make about 2 Millions. Wages 22s. 6d. per week, with good House on Works.
Apply, in first instance, to Mr. COOPER, Gas-Works, Banbury, OXON.

WANTED, for a large Gas Undertaking in the Midland Counties, a smart GAS-FITTER accustomed to the fitting of Gas-Fires, Cookers, and Ventilating Burners. Must be a man of good address. Wages £2 per week to commence.
Apply, by letter, to No. 2717, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, Quotations for 200 yards of 3-inch CAST-IRON PIPES, coated.
State earliest date for delivery, with Price, to the MANAGER, Gas-Works, RICKMANSWORTH.

OIL-GAS BENZOL for Enriching Coal Gas. A few Thousand Gallons to dispose of.
Apply, by letter, in the first place, to No. 2714, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SCRUBBER.

TO be disposed of at once, a Cast-Iron Circular SCRUBBER, 6 feet diameter and 12 feet high, in good condition. Thrown out to make room for larger one.
Apply to R. S. CHURCH, Secretary, Gas-Works, CHICHESTER.

FOR SALE—Four Second-hand Purifiers, 10 feet Square, with 10-inch Dry Centre-Valve, Connections, and Lifting Apparatus. Expected to be thrown out of use early in November.
For Particulars as to Condition, &c., apply, in the first instance, to S. CROSS, Manager, Gas-Works, ABERGAVENNY.

FOR SALE—"King's Treatise on Coal Gas" (Thr e Volumes), "Newbigging's Handbook," "Hempel's Gas Analysis," "Arnold's Manufacture, &c., of Ammonia and Ammonia Compounds," and "Winkler-Lunge's Technical Gas Analysis." All in good condition.
Offers to No. 2718, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SPECIAL PAINT FOR GAS-WORKS.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

SADLER & Co., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making. Kerosene, &c.
Correspondence invited.
Telegraphic Address: "Sadler, Middlesbrough."

SULPHATE OF AMMONIA SATURATORS.

WALTER THOMASON and SONS, Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
Please write for Estimate before ordering elsewhere.

ECONOMY IN PURIFICATION.

INCREASE the Efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP.
And J. EVERY & SON, Phœnix Iron-Works, LEWES.

PATENT RIGHTS for Sale for France and Germany of Thomas Glover and Co.'s PREPAYMENT METERS. This Patent is proving a great success in Great Britain, the Colonies, and the United States of America.
Apply to THOMAS GLOVER AND Co., LIMITED, 214-222 St. John Street, Clerkenwell, LONDON, E.C.

FOR SALE—A Washer-Scrubber, with 6-inch Connections, 3 feet diameter, in four lengths, 17 ft. 9 in. over all. Manhole in each length.
Four CYLINDERS, 3 feet diameter, 4 ft. 3 in. each. Been used for Condensers.
Three 6-inch FOUR-WAY VALVES.
HYDRAULIC, with Connections complete.
All nearly new.
Apply to the EARL SHILTON GAS COMPANY, LIMITED.

CORPORATION OF NELSON.

TENDERS FOR CANNEL.

THE Gas Committee invite Tenders for the supply of 2000 Tons of good round CANNEL.
Form of Tender and mode of delivery may be obtained from Mr. W. Foster, Manager, Gas-Works.
Tenders, marked "Cannel," to be addressed to the undersigned on or before the 13th day of October, 1896.

R. M. PRESCOTT,
Town Clerk.

Town Hall, Nelson,
Sept. 22, 1896.

TO TAR DISTILLERS AND OTHERS.

THE Directors of the Romford Gas and Coke Company, Limited, are prepared to receive TENDERS for the surplus TAR produced at their Works for One, Two, or Three Years, commencing the 1st of October.
The Tar will be delivered into the Contractor's Tank-Vans, or Tank-Trucks on the Siding in connection with the Great Eastern Railway.
Offers to be at per Gallon.
Sealed tenders, endorsed "Tender for Tar," addressed to the Chairman, to be sent in not later than the 10th of October, by Twelve o'clock noon.
The Directors do not bind themselves to accept the highest or any tender.

By order,
HY. JOHNSON,
Secretary.

Romford, Sept. 26, 1896.

COUNTY BOROUGH OF STOCKPORT.
(GAS DEPARTMENT.)

TO OIL IMPORTERS AND DISTILLERS.

THE Gas Committee are prepared to receive TENDERS for 1000 TONS of OIL, to be delivered as required, and suitable for the Manufacture of Carburetted Water Gas.
Firms tendering must state the price per gallon delivered in Tank-Waggons (with the usual facilities for unloading by gravitation) on the Cheshire Lines Sidings at Portwood, Stockport.
Tenders, endorsed "Oil," to be addressed to the Chairman of the Gas Committee, Stockport, and delivered on or before Four p.m. on Thursday, Oct. 8 next ensuing.
Any further Information may be obtained on application to the Engineer, Mr. S. Meunier.
The Committee do not bind themselves to accept the lowest or any tender.

By order,
WALTER HYDE,
Town Clerk.

Stockport, Sept. 25, 1896.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E. and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c. CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special Attention to Repairs.
Before placing Orders, please write for Estimate.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

THE GASLIGHT AND COKE COMPANY.

TENDERS FOR COKE.

THE Directors of this Company are pre- pared to receive TENDERS for the purchase of COKE, to be supplied into Barges or Railway Trucks at their Beckton, Nine Elms, Bromley, and Fulham Stations, within the Twelve Months ending the 30th of September, 1897.
Particulars and Forms of Tender can be obtained upon application at this Office.
Tenders to be sent in on or before noon on Tuesday, the 6th prox., addressed to me, and endorsed "Tender for Coke."
The Directors do not bind themselves to accept the highest or any tender.

By order,
JOHN WILLIAM FIELD,
Secretary and General Manager.

Chief Office: Horseferry Road,
Westminster, S.W., Sept. 25, 1896.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at this Office, on Wednesday, the 30th inst., at Half-past Twelve o'clock precisely, to transact the usual Business, to declare a Dividend for the Half Year ended the 30th of June last, and to elect two Directors and one Auditor in the place of those who go out by rotation, but who are eligible to be re-elected.
Notice is Hereby also Given, that the TRANSFER BOOKS of the Company WILL BE CLOSED on the 19th inst., and RE-OPENED on the 1st of October.

By order of the Court of Directors,
FREDERIC LANE LINGING,
Secretary.

Chief Office: No. 11, George Yard,
Lombard Street, London, E.C.,
Sept. 9, 1896.

ISSUE OF STOCKS AND SHARES BY AUCTION UNDER PARLIAMENTARY POWERS.

MR. ALFRED RICHARDS undertakes the issuing by Auction of GAS AND WATER SHARES under Parliamentary Powers.
He also holds MONTHLY SALES of GAS AND WATER SHARES at the Auction Mart, Tokenhouse Yard, E.C.
Terms for the issuing of Capital, and also for offering to auction Gas and Water Shares, and all Particulars relating thereto, may be had of Mr. Alfred Richards.
Offices: 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the Aldershot Gas and Water Company, the Executors of the late James Moss, Esq., and other Owners.

GAS AND WATER STOCKS, SHARES, AND DEBENTURES IN THE

Aldershot Gas and Water Company.
Brighton and Hove General Gas Company.
West Ham Gas Company.
Hastings and St. Leonards Gas Company.
Eastbourne Gas Company.
Harrogate Gas Company.
South-West Suburban Water Company.
Dorking Gas Company, and
Sutton Gas Company.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, Tokenhouse Yard, London, E.C., on Tuesday, Oct. 27, at Two o'clock precisely, in Lots.
Particulars at the AUCTION MART, and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By Order of the Directors.

500 SHARES IN

THE SOUTHEND WATER-WORKS COMPANY.

MR. ALFRED RICHARDS will Sell by AUCTION at the Mart, London, E.C., on Monday, the 19th of October, 1896, at One for Two o'clock precisely, 500 £10 FULLY-PAID SHARES in the above Undertaking, ranking for a maximum Dividend of 7 per cent. (the last Dividend on the same class of Shares having been at the rate of 5 per cent. per annum).
Particulars of the AUCTIONEER, 18, Finsbury Circus, LONDON, E.C.

"Invaluable to those engaged in lighting or water works."—ENGINEERING.

Now Ready for 1896.

TWENTIETH YEAR OF ISSUE.

GAS and ELECTRIC LIGHTING COMPANIES' DIRECTORY and STATISTICS,

With List of Officials, Engineers, and Managers,

Price, Cloth, 6s.

WATER COMPANIES' DIRECTORY and STATISTICS,

With List of Officials, Engineers, and Managers,

Price, Cloth, 6s.

THE TWO VOLUMES IN ONE, 10s.

LONDON: HAZELL, WATSON, & VINEY, LTD., 1, CREED LANE, LUDGATE HILL.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, NEAR DEWSBURY.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton	10,500 Cub. Ft.
Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 ,,
Ash	2·73 ,,

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY

FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES, SPANNERS, RATCHET BRACES, LIFTING JACKS, ANVILS, VICES, AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE:

90, CANNON STREET, E.C.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

BOLDON GAS COALS.

Worked by THE HARTON COAL CO., LTD.

Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton	10,500	Cubic Feet.
Illuminating Power	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Danish Gas Company, Bombay Gas Company, San Paulo Gas Company, Alliance and Dublin Consumers' Gas Company, Ipswich Gaslight Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For Prices, &c., apply to the

HARTON COAL COMPANY,

LIMITED,

Newcastle-on-Tyne.

W. H. PARKINSON,

FITTER.

THE DRUM

FOR PUMPING AIR, WATER, SEMI-FLUIDS, &c.

See Advertisement in last and next issue.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1¼ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887,

for

CANNEL & COAL.

TYNE

BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft.
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,

COAL OWNERS, NEWCASTLE-ON-TYNE;

OR

E. FOSTER & CO.,

12, JOHN STREET, ADELPHI, LONDON, W.C.

It is Worth Your While to Buy DIRECT.

THE RELIANCE LUBRICATING OIL COMPANY SUPPLY on APPROVAL "RELIANCE" NON-CORROSIVE LUBRICANTS (which, through their superiority, have the largest sale in the world)—viz., Engine, Cylinder, and Machinery Oils, 11½d.; Spindle Oil, 8½d.; Gas-Engine and Dynamo Oils, 1s. 6d. per gallon; Barrels Free and Carriage Paid. Also Liquids for Gas Making, Enriching, &c.

RELIANCE LUBRICATING OIL COMPANY, WATER LANE, GREAT TOWER, LONDON, E.C.

Depôts at Liverpool, Bristol, Hull, Glasgow and Newcastle-on-Tyne. Telegrams: "Subastral, London."

The Cheapest House in the Trade for

LEVER LOCKS FOR

GAS-METERS.

Joseph Oakley & Co.

Excelsior Works, WILLENHALL.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,

SEAHAM HARBOUR, COUNTY OF DURHAM.

HOLMSIDE GAS COALS.

PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation.

Yield of Gas Per Ton. . 11,205 Cubic Feet.
Illuminating Power, 16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality) 13¾ Cwt. Per Ton.
Sulphur . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 103 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

PRESENT DAILY PRODUCE AVAILABLE 2500 TONS.

RESULTS OF DIFFERENT ANALYSES:—

Yield of Gas Per Ton. . 10,500 Cubic Feet.
Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . 13½ Cwt. Per Ton.
Sulphur . . . . . 1·13 Per Cent.
Ash. . . . . 1·34 Per Cent.
Tar. . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 94½ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COAL-FIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,

HOLMSIDE AND SOUTH MOOR OFFICES,

NEWCASTLE-UPON-TYNE.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED

— *v* —

"DE MARE" COMPANY.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED.

— *v.* —

"SUNLIGHT" COMPANY.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED, HEREBY GIVE NOTICE, as follows:—

VALIDITY. The Company's Patent has been declared VALID ON ALL POINTS after a Fifteen-Day Trial.

NATURE OF INVENTION. The Invention was described by Mr. Justice Wills as a "PIONEER INVENTION."

SCOPE OF PATENT. The Patent HAS BEEN GIVEN A WIDE CONSTRUCTION; and it was held that the protection given by it was not confined to Mantles manufactured according to the particular prescriptions set out in the Specification.

SHAPE OF MANTLE. The Judge held that a Mantle, even if made in a different form or shape (such as the "De Mare" Fringe or Plume), IS STILL AN INFRINGEMENT of the "Welsbach" Patent.

"DE MARE" JUDGMENT. Judgment for an INJUNCTION, WITH FULL COSTS, has been given against the "De Mare" Incandescent Gas-Light System.

"SUNLIGHT" JUDGMENT. Judgment was given AGAINST the "Sunlight" Incandescent Gas-Lamp Company, Limited, on the question of the VALIDITY OF THE PLAINTIFFS' PATENT.

"SUNLIGHT" MANTLES. Last about 100 hours.

"WELSBACH" MANTLES. Last about 1000 hours.

"Sunlight" Mantles BURN DOUBLE THE GAS to produce the same candle power as the Incandescent Gas-Light Company's Mantles.

Users of "Sunlight" Mantles are applying to the Incandescent Gas-Light Company to REPLACE THEM BY THEIR OWN MANTLES.

WARNING. Users of the Incandescent Gas-Light Company's Mantles upon "Sunlight" Burners ARE INFRINGERS OF THE COMPANY'S PATENT, AND WILL BE AT ONCE PROCEEDED AGAINST.

COSTS. Certificates of the Validity of the Company's Patent have been granted both by Mr. Justice Romer and Mr. Justice Wills entitling the Company to Solicitor and Client Costs, which will, IN ALL CASES, BE RIGOROUSLY ENFORCED.

INFRINGERS. The Incandescent Gas-Light Company WILL TAKE PROCEEDINGS AGAINST ALL PERSONS INFRINGING THEIR PATENT WHETHER

MAKERS,
WHOLESALE DEALERS,
RETAILERS,
or
USERS.

Users of the Company's Mantles upon Burners not sold by the Company ARE INFRINGERS.

"LIMITED LICENSE" WARNING. Judgments have already been obtained against such users from Mr. Justice Chitty, Mr. Justice Stirling, Mr. Justice Kekewich, and Mr. Justice North.

FAITHFULL & OWEN,

11, Victoria Street, Westminster.

Solicitors to the Incandescent Gas-Light Company, Limited.

April, 1896.

NOTICE.

The attention of the METEOR INCANDESCENT LIGHTING COMPANY, LIMITED, having been again called to the Advertisements inserted in various papers by the Incandescent Gas-Light Company, Limited, of Palmer Street, Westminster, to the effect that the "Meteor" Incandescent Gas-Lights are an Infringement of their Patents, and that they will bring Actions for Infringement against all persons found dealing in any manner with such Lights, the METEOR INCANDESCENT LIGHTING COMPANY, LIMITED, HEREBY GIVE NOTICE that they are advised that the "Meteor" Incandescent Lights in no way infringe any of the Patents of the Incandescent Gas-Light Company, Limited, that an action has been commenced to restrain such threats, and that they are PREPARED TO FULLY INDEMNIFY ALL PURCHASERS, DEALERS, AGENTS, and USERS of their Lights against any Legal Proceedings on the part of the Incandescent Gas-Light Company, Limited.

WILSON, BRISTOWS, & CARPMAEL,

1, Copthall Buildings, London, E.C.,

Solicitors to the Meteor Incandescent Lighting Company, Limited, of 35, New Broad Street, London, E.C.

Nov. 30, 1895.

Fcap. 4to, Cloth, price 7s. 6d., post free

Practical Photometry.

By William Joseph Dibdin, F.I.C., F.C.S.

LONDON: Walter King, 11, Bolt Court, Fleet St., E.C.

TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 34, OLD BROAD ST., E.C.

PRICE'S COKE & COAL BARROW

effecting a great saving of time, labour, and expense.

For Particulars, Price, &c., apply to Mr. EDWARD PRICE, 119, Queen's Road, FINSBURY PARK, N.

Prices are Reduced.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,

MANUFACTURE

SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY

FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

WENHAM LAMP.

WEBER & CO., Steatite Makers,

12 & 13, BRIDGEWATER STREET,

LONDON, E.C.

Now supply direct to the Trade, **RINGS** and **BUTTONS**, same Quality and Sizes as we manufactured exclusively for the late Wenham Company; and **WE ALLOW MUCH HIGHER DISCOUNTS.**

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.

8 Lombard Street, NEWCASTLE-ON-TYNE.

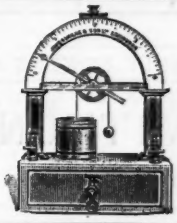
W. RICHARDSON, Fitter.

JAMES MILNE & SON, LTD.,

GAS ENGINEERS,

MILTON HOUSE WORKS, EDINBURGH.

LONDON. — GLASGOW. — LEEDS.



Wrought-Iron

And Fittings and Accessories.

LAMBERT BROS., WALSALL,

MANUFACTURERS OF

WROUGHT-IRON TUBES & FITTINGS for GAS, WATER, & STEAM,

BRASS GAS-FITTINGS, GAS-VALVES, STEAM & WATER VALVES, TOOLS, &c., AND OF WARNER'S PATENT MARKET GAS STAND-PIPE.

LONDON: LAMBETH BRASS & IRON CO., Ltd., Short St., LAMBETH.

JOHN BROWN & CO., LTD., SHEFFIELD.

Proprietors of

ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

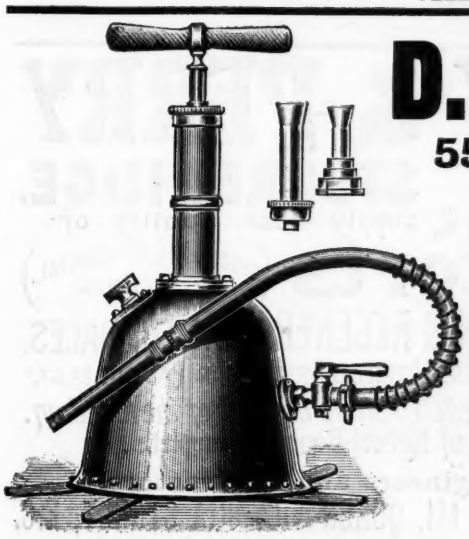
ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·80.

VERY FREE FROM IMPURITIES.

TELEGRAMS: "ATLAS, SHEFFIELD."



D. HULETT & CO., LTD.

55 & 56, High Holborn, London.

GAS SERVICE CLEANSERS.

LAMP TORCHES.

DRY GAS-METER MAKERS.

WROUGHT-IRON TUBES & FITTINGS.

STREET LAMPS & POSTS.

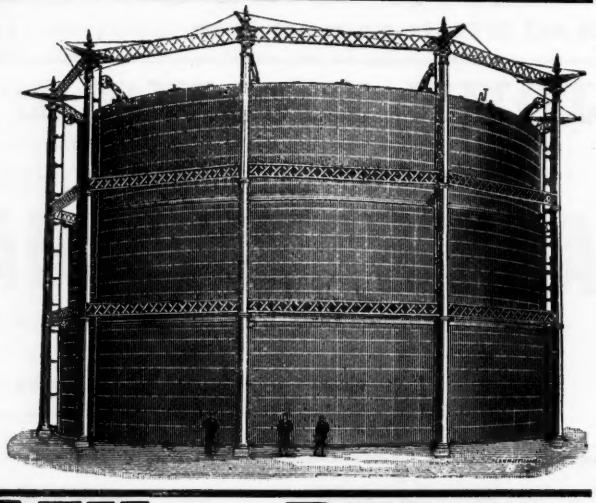
PRICE LISTS ON APPLICATION.

STOURBRIDGE
RETORTS AND FIRE-BRICKS.
BEST QUALITY.
KING BROTHERS, STOURBRIDGE.
[See Illustrated Advertisement, Sept. 1, p. 436.]

OXIDE OF IRON.
NATURAL BOG ORE FROM OWN MINES.
Samples and Prices on application.
WM. H. MÜLLER & CO.,
81, PALMERSTON BUILDINGS, LONDON, E.C.
TRADE MARK: "Compascum." Telegraphic Address: "FERRUM."

GASEOUS FIRING A SPECIALTY.
Telegraphic Address: "DRAKESON, HALIFAX."
Telephone No. 43. HALIFAX EXCHANGE.
GAS ENGINEERS. CONTRACTORS.
RETORT SETTERS. FURNACE BUILDERS.
IRONFOUNDERS. &c. &c.
JONAS DRAKE & SON
SOLE AGENTS For "HISLOP'S" PATENT REGENERATIVE FURNACES. FOR ENGLAND, WALES & ABROAD.
OVENDEN, HALIFAX.
SOLE MAKERS OF "MITTON'S" PATENT SELF-SEALING RETORT-LID.
SOLE MAKERS OF "SETTLE'S" PATENT COMBINED SEAL-REGULATING FLUSH-VALVE.
LONDON OFFICE; 60, QUEEN VICTORIA ST., E.C.

HANNA, DONALD, & WILSON,
(Established 1851),
GAS ENGINEERS & CONTRACTORS,
Abercorn Foundry and Abbey Works,
PAISLEY, N.B.,
MAKERS OF
Gasholders and Gas Plant
OF EVERY DESCRIPTION.
Sole Agents for Scotland for the Automatic Coal-Gas Retort (Inclined System) Company, Limited.
Telegraphic Address: "Donald, Paisley."



MOBBERLEY & PERRY
STOURBRIDGE.
Manufacture & supply best quality of
Gas Retorts (SEGMENTAL, HORIZONTAL, or INCLINED.)
Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.
FIRE BRICKS, LUMPS, & TILES, BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c. &c.
EVERY REQUISITE FOR GAS-WORKS. Retort Setters sent to any part of the Kingdom.
Contractors for the erection of Retort-Benches complete.
London Agents:
BALE & HARDY, Gas Engineers and Contractors, BRIDGE HOUSE, 181, QUEEN VICTORIA STREET, E.C.

IMPROVEMENTS IN STREET LIGHTING.

Highest Efficiency with Greatest Economy.

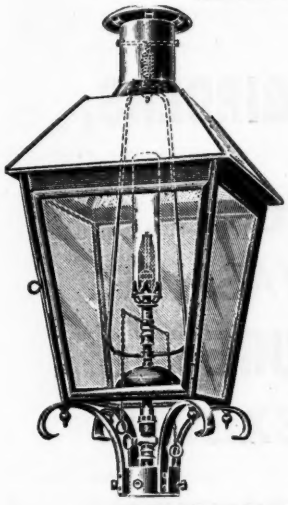
LIGHTING AUTHORITIES, GAS ENGINEERS, and GAS MANAGERS

are invited to inspect the

INCANDESCENT GAS-LIGHT

(Welsbach System)

which has now been successfully adapted to the purposes of

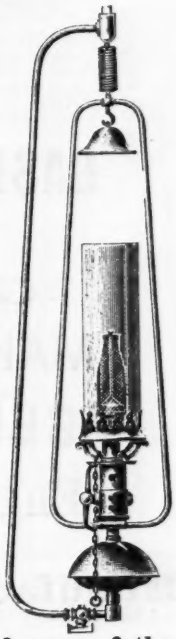


STREET LIGHTING,

the difficulties caused by VIBRATION having been OVERCOME by the use of the

NEW SPRING SUSPENSION FRAME (Patent).

This System of Lighting meets the requirements of all Lighting Authorities in those Districts where it is desired to effect an Improvement in Street Lighting WITHOUT INCREASE OF EXPENDITURE.



The following are Extracts from a PAPER read by Mr. F. G. DEXTER, before the SOUTHERN DISTRICT ASSOCIATION.

"The success of the experimental (Welsbach) lighting secured the contract for one of the Parish Council Districts; and this was shortly followed by the contract for three years for the city lamps. The total represents altogether about 500 single lamps, and 15 refuge lamps containing two lights."

"In the matter of maintenance of the street lights, the record is favourable—in fact, more so than the estimate provided. By the test-meter, the average daily consumption works out to 38 cubic feet per light, including bye-pass. The bye-pass consumes with a flame half an inch long, $\frac{1}{6}$ foot per hour. This represents 1000 cubic feet per lamp per annum. The average consumption per light, when in use, works out to 12,900 feet per annum, or about $3\frac{3}{5}$ feet per light per hour. The lighting is continued all the year round, from the average times of one hour after sunset to one hour before sunrise."

"The mantles have worked out to an average of three per lamp per annum; but, bearing in mind the absence of frost last winter, the writer believes that four mantles per light is more likely to represent average conditions."

"In the matter of cleaning, it may be said that the lanterns require less attention than with the ordinary flat-flame burner."

"The number of lights attended to per man averages 85."

"The 'Welsbach' Light is undoubtedly one of the greatest aids to successful competition that the Gas Industry has ever experienced. Its influence, while reducing the relative cost of light, has advanced the consumption of gas all over the country by the increased satisfaction of the existing consumers, and the attraction of others. The writer feels that its influence should not be confined to the house. It is capable of meeting every competitor in the street, from cheap oils to arc lights, in cost and in effect; and it is hoped that the foregoing experience may lead many others to seek its aid and to realize its efficiency."

FOR PRICES AND PARTICULARS, APPLY TO THE

INCANDESCENT GAS-LIGHT CO., Ltd.,

Palmer Street, Westminster, London.

WILLEY & CO.,

GAS ENGINEERS,

LONDON & EXETER.

Offices: HAVEN ROAD, EXETER.

MANUFACTURERS OF

GASHOLDERS, ROOFS, BRIDGES, GIRDERS,

AND EVERY DESCRIPTION OF

GAS APPARATUS.

MAKERS OF THE LIVESEY WASHER.

AGENTS FOR THE MAXIM CARBURETTOR.

Engineering Works: ST. THOMAS, EXETER.

Manufacturers of WET and DRY GAS-METERS of unsurpassed excellence.

Patent Penny-in-the-Slot AUTOMATIC METER with the latest improvements. Fraud Proof, Perfect in Action, Accurate in Registration, Instantaneous Price Adjustment *in situ* without Change Wheels.

Meter Factories: JAMES STREET, EXETER, and 248, KINGSLAND ROAD, LONDON, N.

Metropolitan Agent:

FRANK ACLAND, M.Inst.M.E., M.Inst.C.E., 70, Cheapside, E.C.

MANUFACTURERS OF

GAS-FITTINGS

IN ENDLESS VARIETY.

CHANDELIERS, BRACKETS, PENDANTS, MAIN COCKS, &c., &c., &c.

SPECIAL FITTINGS FOR THE AUTOMATIC BUSINESS.

Brass Foundries and Works: ST. THOMAS, EXETER.

Telegraphic Address: "WILLEY, EXETER." Telephone 132. Established over 30 Years.

ALEX. C. HUMPHREYS, M.Inst.C.E. A. G. GLASGOW, M.E.

MESSRS. HUMPHREYS & GLASGOW

Have constructed their EUROPEAN type of

CARBURETTED WATER-GAS PLANT

At the following Gas-Works:—

Copenhagen	700,000 Cub. Ft.	Brighton	1,500,000 Cub. Ft.
Belfast	1,700,000 ,,	Preston	1,500,000 ,,
Glasgow	300,000 ,,	Southport	750,000 ,,
Brussels	700,000 ,,	Bath	1,000,000 ,,
Liverpool	3,500,000 ,,	New York	1,200,000 ,,
Tottenham	750,000 ,,	Newburgh, N.Y.	350,000 ,,
Santiago	400,000 ,,	Tottenham (Second Contract)	750,000 ,,
Swansea	750,000 ,,	St. Joseph, Mo.	750,000 ,,

And have now under Contract:—

Belfast (Second Contract)	4,500,000 Cub. Ft.	Stockton-on-Tees	500,000 Cub. Ft.
Shanghai	225,000 ,,	Stockport	500,000 ,,
Winchester	200,000 ,,	Norwich	1,000,000 ,,
Hoylake	125,000 ,,	Guildford	350,000 ,,
Manchester	3,000,000 ,,	Syracuse, N.Y.	850,000 ,,
Brussels (Second Contract)	700,000 ,,	Bordentown, N.J.	125,000 ,,
Holyoke, Mass.	600,000 ,,	Lea Bridge	350,000 ,,
Edinburgh	2,000,000 ,,	Newburgh, N.Y. (Second Contract)	250,000 ,,

In addition to which the previous Installations of The Gaslight and Coke Company under this System have a total capacity of 10,000,000 cubic feet per diem.

9, Victoria Street, London, S.W.

Telegrams: "EPISTOLARY, LONDON."

United States Office, 64, Broadway, New York.

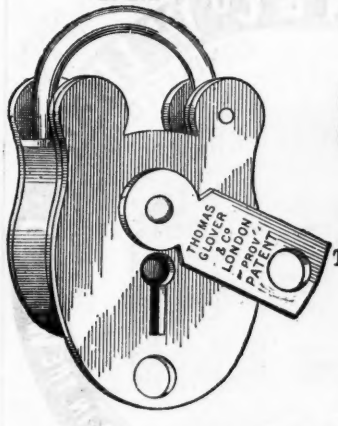
[ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.]

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;

The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.

OPEN.



THOMAS GLOVER & CO.'S

PATENT

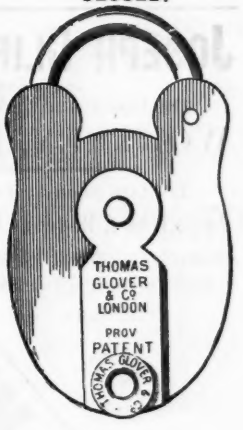
SECURE PADLOCK

Prevents Tampering with the

CASH-BOXES OF PREPAYMENT METERS.

The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.

CLOSED.



Telegraphic Address: "GOTHIC LONDON." Telephone No. 6725.

THOMAS GLOVER & CO., LTD.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

BRISTOL:
62, VICTORIA STREET,
Telegraphic Address: "GOTHIC."

BIRMINGHAM:
1, OOZELLS STREET.
Telegraphic Address: "GOTHIC."

MANCHESTER:
37, BLACKFRIARS STREET.
Telegraphic Address: "GOTHIC."

BOWENS' Ltd. Successors,
STOURBRIDGE.

MANUFACTURERS OF

BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.

Established 1860.

Gas-Bags for Mains. High Water-Boots. Woollen Miners' Jackets.

Delivery and Suction Hose, Gutta-Percha Acid Bottles, Leather Driving Bands, Woven Canvas Hose for Fire-Engines, Wedge and Square Gas-Bags, Air and Water Beds for Invalids, Oil Tarpauling Coats, Trousers, Hats, &c., Squeegees for cleansing Pavements, &c., Billiard and Bagatelle Cush, Tricycle Tyres, Leather Hose, Cotton Waste, Engine Cloths, Oils, &c., India-rubber Waterproof Garments for Walking, Driving, or Sporting Wear, Diving and Wading Dresses, Printers' Blankets, Iron Wheels and Rollers covered with India-rubber. Stokers' Gloves, 14s. 6d. per dozen.

Write for Price List to

THOMAS BUGDEN, Manufacturer,

71, GOSWELL ROAD, LONDON, E.C.

The Climax of Regenerative Gas Lighting!!

THE

"VERTMARCHE"

A 280-CANDLE POWER PLAIN IRON LAMP,

CLASS A— 55/-

LIGHT for LIGHT less than half the price of any other Regenerative Lamp.

Manufactured in England.

HENRY GREENE & SONS,

153 & 155, CANNON STREET, LONDON BRIDGE, E.C.

PARTICULARS AND PRICES FREE. AGENTS WANTED.

JOSEPH CLIFF & SONS,

INCORPORATED IN

THE LEEDS FIRE-CLAY COMPANY, Ltd.,

WORTLEY, LEEDS.

LONDON OFFICES & DEPÔTS:

Baltic Wharf, Waterloo Bridge.

WHARVES NOS. 2 & 4, INSIDE G.N. GOODS YARD, KING'S CROSS, N.

LIVERPOOL:

16, Lightbody Street.

LEEDS:

Queen Street.

MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.

Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

HARPER & MOORES,
STOURBRIDGE.

MANUFACTURERS OF

BEST FIRE-BRICKS, GAS-RETORTS,

LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.

Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.

MANUFACTURERS OF GLASSHOUSE POTS AND CRUCIBLES OF EVERY KIND.

ESTABLISHED 1836.

OSLER,
BIRMINGHAM.

MANUFACTURERS OF GASELIERS IN GLASS AND METAL.

WILSON CARTER & PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station, or for Export, all kinds of Fuel for Gas purposes.

ADDRESS CHIEF OFFICES:

Temple Buildings, 50, New Street, Birmingham.

WILLIAM INGHAM & SONS,

Incorporated with the Leeds Fire-Clay Company, Ltd.,

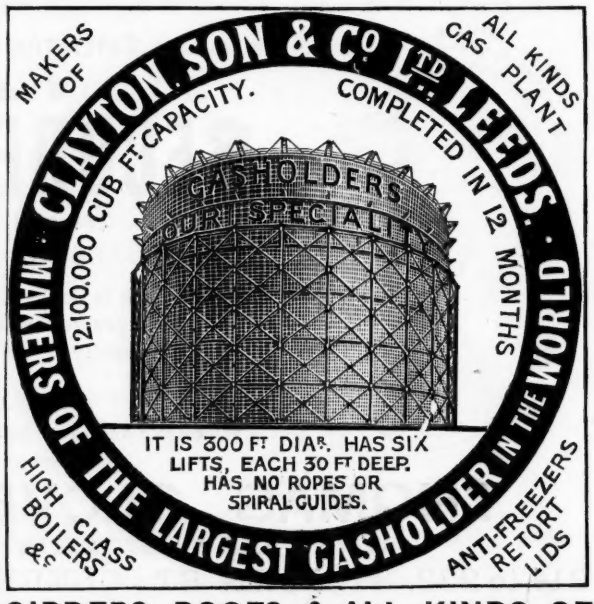
WORTLEY FIRE-CLAY WORKS, Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT

MACHINE-MADE GAS-RETORTS.


MAKERS OF
CLAYTON, SON & Co LTD LEEDS.
ALL KINDS GAS PLANT
12,100,000 CUB FT CAPACITY.
COMPLETED IN 12 MONTHS
GASHOLDERS OUR SPECIALITY
IT IS 300 FT DIAR. HAS SIX LIFTS, EACH 30 FT DEEP. HAS NO ROPES OR SPIRAL GUIDES.
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD
HIGH CLASS BOILERS &c
ANTI-FREEZERS RETORT LIDS

GIRDERS, ROOFS, & ALL KINDS OF STRUCTURAL IRONWORK.

London Office: 60, QUEEN VICTORIA STREET, E.C.

Telegraphic Addresses: "GAS, LEEDS" "ECLARAGE, LONDON."

GODDARD, MASSEY, & WARNER'S

IMPROVED

Sulphate of Ammonia Apparatus.

The most successful and approved Apparatus known up to the present time.

FOR REFERENCES, PARTICULARS, TESTIMONIALS, AND PRICES, APPLY TO

GODDARD, MASSEY, & WARNER,

ENGINEERS,

NOTTINGHAM.

The Apparatus has been supplied to the following Firms—

BURT BOULTON, & HAYWOOD, SILVERTOWN, and ELING.
CHANCE BROTHERS, OLDBURY (Four Apparatus).
RUNCORN SOAP & ALKALI CO., Limited, RUNCORN.
NETHAM CHEMICAL CO., Limited, BRISTOL.
ANIMAL CHARCOAL CO., Limited, SHADWELL.
WM. BUTLER & CO., BRISTOL.
KEMPSON & CO., Pye Bridge.

And to the following Gas Companies and Corporations—

ILKESTON.
WIDNES.
HALIFAX.
ALTRINCHAM.
DENTON.
ST. ALBANS.
DUKINFIELD.
NORTHWICH.
HUDDERSFIELD.
BURY.
BRIGHOUSE.
MARKET HARBRO'
PRESCOT.
SOWERBY BRIDGE.
LEICESTER.
DARWEN.
NELSON.
ORMSKIRK.
CHORLEY.
WHITEHAVEN.
CHESTER.
SOUTH SHIELDS.
LEEK.
IPSWICH.
BOURNEMOUTH.
SALFORD.
LUTON.
HAMPTON COURT.

CHARGING OR COAL MEASURING TRUCKS.

FOUR CENTRE SIDE TIP WAGGON.

SPECIALITIES—

LYON & DEIGHTON'S PATENT SCOOP FILLING WAGGONS,

Steel Coal and Coke Barrows, Steel Charging or Coal Measuring Waggons, Railways, Points, and Crossings, Patent Turntables (requiring no Lubrication), Charging Scoops, Rake-Heads, Revolving Screens, Hoppers, &c., Cast-Iron Smith's Hearths, Steel Side Tipping Waggon, End Tip Waggons, or Universal Tip Waggons. Lyon's Patent "Cradle" Side, End, or Universal Tip Waggons for easily working heavy loads.

C. W. LYON, Engineer, Thornhill-Lees, Dewsbury.

ARROL-FOULIS

Patent Automatic Machinery

FOR

DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers,

SIR WILLIAM ARROL & CO., Limited,

GLASGOW.

[See Illustrated Advertisement, Sept. 1, p. 437.]

PELOUZE & AUDOUIN'S

PATENT MECHANICAL CONDENSER.

Over 292,000,000 Cubic Feet of Gas per Day is passing through about 550 of these Machines.

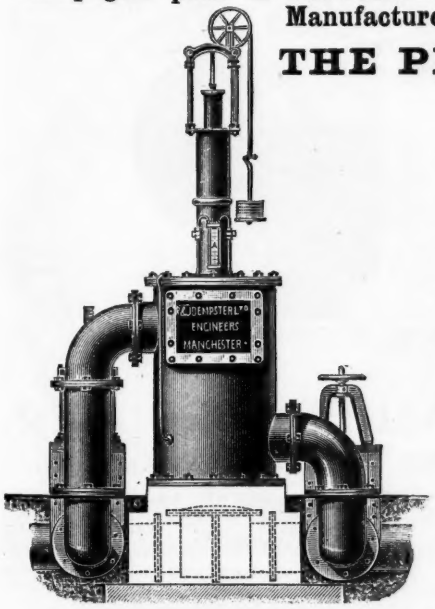
Messrs. R. & J. DEMPSTER, Limited,

HAVE PLEASURE IN ANNOUNCING THAT THEY HAVE MADE ARRANGEMENTS WITH THE

Compagnie pour la Fabrication des Compteurs et Materiel d'Usines a Gaz, of Paris, to Manufacture and Sell in this Country and the Colonies,

THE PELOUZE & AUDOUIN CONDENSER,

According to P. AUDOUIN'S LATEST PATENTS.



FRONT ELEVATION.

This Apparatus is in very general use in most of the Gas-Works on the Continent and in America; over **550** being in use in different parts of the World for condensing and arresting all Tar Particles and Vapours from the Gases from Coal, Oil, and Wood.

The large number in use is sufficient proof of its utility. By the almost complete elimination of Tar, which is effected to the extent of 99·7 per cent., it facilitates Purification in the Purifiers, by preventing the clogging or obstruction of the Purifying Materials, which, in consequence, last much longer; thus effecting a Saving both in Materials and Labour.

So effective is this Apparatus that a piece of white paper placed over a Test-Tap on the Inlet of the Machine is immediately covered with Tar, whilst on the Outlet the white paper remains perfectly clean.

The Machines are made in the following sizes, for Works producing per 24 hours—

	Cubic Feet.		Cubic Feet.
0	35,000	5	500,000
1	70,000	6	700,000
2	140,000	7	1,240,000
3	210,000	8	1,750,000
4	350,000	For larger Makes, two Machines are recommended.	

For Prices and further Particulars, apply to the Sole Makers—

Telegraphic Address: "SCRUBBER, MANCHESTER." **R. & J. Dempster, Ld., Gas Plant Works, Newton Heath, Manchester.** Nat. Telephone Nos. 2296 & 54.

"HOLOPHANE" Ltd.

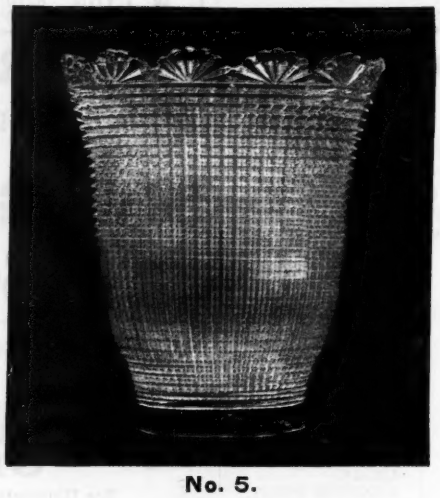
THE "HOLOPHANE" SYSTEM FOR GENERAL ILLUMINATION

(BLONDEL AND PSAROUDAKI'S PATENTS.)

APPLICABLE TO ALL FORMS OF LIGHT—

ARC and INCANDESCENT ELECTRIC, INCANDESCENT GAS, and OIL LAMPS.

1. A globe designed upon strictly scientific principles.
2. Grooved vertically inside in order to diffuse the light.
3. Grooved horizontally outside in order to distribute the light.
4. Throws the light in any required direction.
5. Softens all glare while increasing effective illumination.
6. **Gives double the illumination for the same money.**



No. 5.

7. Tested and proved by the Laboratoire Central d'Électricité, Paris.
8. Results confirmed by the Edison Electric Light Company, Paris, and Professor Vivian B. Lewes, London.
9. Shows a uniformly incandescent and brilliant surface.
10. **Mellows harsh centres of light, and destroys sharp shadows.**

Prices from 24s. per Dozen. Illustrated Lists and Terms on Application.

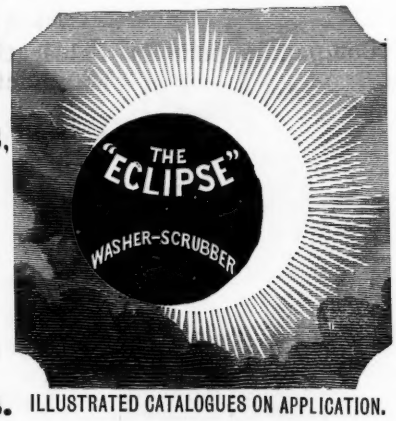
SHOW-ROOM AND OFFICES: 91, 93, & 95, QUEEN VICTORIA ST., LONDON, E.C.

CLAPHAM BROTHERS, LTD.,

— ESTABLISHED 1837 —

Wellington, Nelson, and Market Street Works,

KEIGHLEY, Yorks.



RETORT-FITTINGS,
CONDENSERS,
PURIFIERS, WITH PLANED JOINTS.

GASHOLDER TANKS,
COLUMNS, GIRDERS,
LAMP-POSTS,

And all Kinds of Gas-Making Apparatus and General Ironwork.

GAS and WATER VALVES and MAINS. ILLUSTRATED CATALOGUES ON APPLICATION.

ALSO SOLE MAKERS OF

Laycock & Claphams' Patent "ECLIPSE" WASHER-SCRUBBER,

Which is efficiently dealing with a total of **85,600,000** Cubic Feet of Gas per day.

Repeat Orders speak for themselves, some of which are given below—

		CAPACITY, CUB. FT.
Sheffield United Gas Company	2 Machines	1,500,000 each.
Do. do.	2 ,,	4,000,000 ,,
Halifax Corporation . . .	2 ,,	3,000,000 ,,
Keighley Corporation . .	2 ,,	1,000,000 ,,

		CAPACITY, CUB. FT.
Manchester Corporation. .	2 Machines	4,000,000 each.
Do. do. . .	1 Machine	3,000,000
Rochester, Chatham, & Strood . . .		1,000,000
Do. do. . . .		1,500,000

CONTRACTORS TO HER MAJESTY'S GOVERNMENT.

LONDON: Printed by WALTER KING (at the Office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Sept. 29, 1896.